

SHORT ACADEMIC REVIEW

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a member of a Scientific Jury, determined by Order № P1882 / 22.10.2021 of the Rector of the Medical University of Plovdiv for conducting a competition for the academic position "Associate Professor" for the needs of the Medical University of Plovdiv, Department of Psychiatry and Medical Psychology for teaching in Bulgarian and English language in the scientific specialty "Psychiatry" professional field 7.1 "Medicine", field of higher education 7. "Health and Sports", announced in SG № 63/30.07.2021

CANDIDATE: Dr. Sevdalina Sevdalinova Karaivanova – Kandilarova, PhD - Chief Assistant Professor at the Department of Psychiatry and Medical Psychology, Medical University of Plovdiv.

I. Analysis of the candidate's career profile

1. Professional development:

- she graduated with a master's degree in medicine from the Medical University of Plovdiv in 2005 with honours.
- since 2017 she has acquired a specialty in Psychiatry.
- from October 2007 to September 2008 she worked as a resident doctor in the Department of Gerontopsychiatry at the Psychosomatic Clinic of the University Hospital Haukeland, Bergen, Norway
- from 2008 to 2010 she specialized Psychiatry at the Tertnes Psychiatric Outpatient clinic at Haukeland University Hospital, Bergen, Norway and from 2013 to 2017 continued her specialization at the Clinic of Psychiatry and Medical Psychology of the University Hospital "St. George", Plovdiv.
- Since February 2021 and currently works as a psychiatrist at the Clinic of Psychiatry and Medical Psychology of the University Hospital "St. George", Plovdiv.
- between 2006 and 2018 she participated in training courses, most of them abroad, on various aspects of the application of neuroimaging methods for studying the human brain in norm and pathology.

2. Academic development:

- between 2006 and 2007 she was a member of the fMRI Research Group at the Department of Cognitive Neuroscience, Division of Biological and Medical Psychology at the University of Bergen, Norway under the leadership of Prof. Kenneth Hugdal
- from 2012 to 2016 she was a full-time doctoral student at the Department of Psychiatry and Medical Psychology, Medical University of Plovdiv and elaborated a dissertation on "Neurophysiological markers for diagnosis and prognosis in depression",
- in 2017, after successfully defending the dissertation thesis, she obtained the educational and scientific degree "Doctor of Philosophy" in Psychiatry.

- Since February 2014, after a competition, she was selected as an assistant professor at the Department of Psychiatry and Medical Psychology, Medical University of Plovdiv and since March 2018 she is a Chief Assistant at the same department.

- Since 2015 she is a member of the research team at the Complex of Translational Neuroscience of MU-Plovdiv.

Summary: Dr. Sevdalina Kandilarova builded her professional and research skills in an academic community with established good traditions and internationally recognized experts in the field of psychiatry and cognitive neuroscience. Working in international centers with achievements in the most innovative methods for assessing higher brain functions and the constant desire of Dr. Kandilarova to acquire in-depth theoretical knowledge and practical skills determined her growth as a highly qualified specialist and researcher.

II. General description of the materials presented for the competition.

Dr. Kandilarova has submitted for reviewing a complete set of documents, in accordance with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (2018) and the Rules and regulations of MU-Plovdiv. They are supported by comprehensive evidence in the main areas - professional activity, academic development, teaching and research, including an official reference about publications and citations.

Thirty scientific works are presented:

- articles in international journals with IF – 20;
- articles in international referenced journals without IF – 2;
- articles in national scientific journals – 2;
- Abstracts in international journals with IF фактор – 3;
- Abstracts in international referenced journals without IF – 1;
- Abstracts from national scientific forums – 1.
- Abstract from the PhD thesis – 1.

Dr. Kandilarova participates in the author's team of 4 textbooks: «Textbook of Psychiatry for medical students» in Bulgarian and English and «Textbook of Medical Psychology for medical students» in Bulgarian and in English.

There are **85 citations** of Dr. Kanilarova's scientific papers, all in referenced journals, most of them with IF.

III. Assessment of the candidate's scientific work for overall academic development.

1. General characteristic of the scientific and publication activity.

Dr. Kandilarova participated in the competition with 24 full-text scientific publications, 4 textbooks and 5 scientific abstracts. Scientific publications include 20 articles in scientific journals with impact factor, 2 in foreign peer-reviewed journals without IF and 2 in national journals.

The scientific contributions of Dr. Kandilarova's research can be grouped in the following areas:

Unconventional functional magnetic resonance imaging (fMRI)

As a part of the team of Psychiatry at the Complex for Translational Neuroscience, as well as of the Research Institute at the MU-Plovdiv, Dr. Kandilarova is a major contributor to the development of an innovative research model that combines routinely used scales for clinical - psychological (psychiatric) assessment with fMRI. The aim is to translate the clinical-psychological scales into the neuroimaging markers, in order to objectify the subjective assessment based on what is shared by the patient. The successful application of this method in patients with depression and healthy controls proves its ability to distinguish normal condition from pathology and is the basis of Dr. Kandilarova's doctoral dissertation. Continuing this project, an upgrade of the paradigm has been developed and has been applied to patients with schizophrenia and depression. The results of this study, reflected in most of the presented publications (over 10), prove the ability of the method to distinguish between different psychopathological constructs. Along with the classical univariate analyzes, several publications have used multivariate analysis based on machine learning using multimodal data from structural and functional imaging - at rest and during cognitive tasks. As a result, convincing data have been generated for the successful convergent cross-validation between clinico-psychological scales for evaluation and fMRI images with the establishment of specific activations and brain signatures typical for different groups of patients (with paranoid and depressive syndrome). Determining the contribution of the various modalities (structure, function at rest and in the performance of a task) to the differential diagnosis of schizophrenia and affective disorders has a particularly high scientific and practical value.

Conventional fMRI in resting state

Research on the brain connectivity at rest is another essential part of the candidate's scientific output. Using the method of spectral dynamic causal modeling, disturbances of the functional connectivity between different hubs of the brain networks in patients with depression and healthy controls were revealed, and original results for the role of the anterior insula were established. These findings have raised a significant interest in the scientific literature, as evidenced by the large number of citations of the work (over 20 in journals with high IF - up to 13,382).

A significant scientific contribution is the identification of connectivity changes in the context of a transdiagnostic study in patients with schizophrenia, bipolar and monopolar depression. A number of potential differential diagnostic markers have been identified, including the values of the effective connectivity from the left lateral orbitofrontal cortex to the left anterior precuneus, which could be used to distinguish bipolar from monopolar depression with an accuracy of up to 75%.

Conventional task-related fMRI

An original block paradigm has been developed for the simultaneous application of visual stimuli from the International Affective Pictures System (IAPS) and fMRI, which has been used in the assessment of patients with depression and healthy controls. Significant theoretical and methodological contribution in this field is the evidence for the advantages of multivariate methods in the analysis multimodal data from structural and functional magnetic

resonance imaging in performing the task, compared to widely used classical univariate methods.

In collaboration with the Department of Neurology, a paradigm based on the Paced Visual Serial Addition Test (PVSAT) in patients with relapsing-remitting multiple sclerosis has been developed. The aim is to assess the impact of the fatigue syndrome and the mood on the test results and the brain activations during its implementation. The obtained results contribute to the disclosure of additional details of the pathological and compensatory mechanisms determining cognitive functioning in these patients.

Structural MRI

Although fewer in number, publications on structural changes in patients with mental disorders identified by the quantitative method of voxel-based morphometry represent a significant contribution. It has been found that depression is associated with a significant reduction in the gray matter volume of certain regions located in the frontal and temporal lobes. The topic was further developed in the subsequent meta-analysis, in which a comparison was made between depression, anxiety and post-traumatic stress disorder, which identified specific structural correlates for each of these disorders.

2. Scientific activity - implementation of the scientific and practical achievements of the candidate among the scientific community;

Dr. Kandilarova has an established authority in our country and among the international community of experts working in the field of fMRI. She actively and regularly participates in international workshops and is a lecturer in the training of students, young researchers and teachers in the methods of fMRI, in the design of paradigms and fMRI data processing. Evidence of the international recognition of Dr. Kandilarova's scientific achievements is her participation in the Human Brain Project Medical Informatics Platform.

3. Scientific projects

Dr. Kandilarova has participated in **9 research projects** - 4 university research projects at MU-Plovdiv, 3 national, funded by the Ministry of Education and Science and 2 international.

4. Scientific authority

Dr. Kandilarova has received recognition for her scientific achievements at home and abroad. She is a member of the Bulgarian Psychiatric Association and is a reviewer for prestigious journals with an impact factor, such as the Journal of Affective Disorders and Acta Radiologica and has prepared 8 reviews for various national and foreign journals.

IV. Evaluation of habilitation work

The habilitation work of Dr. Kandilarova, presented in 10 publications in referenced journals, summarizes the results of in-depth research on the use of MRI in patients with schizophrenia, bipolar and monopolar depression. Specific structural correlates have been

found in patients with depression, differentiating them from anxiety and post-traumatic stress disorder. Studies of resting state brain connectivity in patients with schizophrenia and depression provide evidence to support the hypothesis of an aberrant network between the dorsolateral prefrontal cortex and anterior insula that leads to behavioral abnormalities depending on the direction of the impact. These data are a significant scientific contribution to the understanding of the mechanisms underlying the psychopathological disturbances in schizophrenia and depression. Scientific and practical value has the developed innovative research method combining clinical-psychological scales, structural and functional MRI with multivariate analysis based on machine learning to differentiate schizophrenia from affective disorders.

V. Citation of candidate's publications in national and foreign literature (publication image).

Evidence of the qualities of the candidate's scientific publications is their positive citations in prestigious referenced journals.

The presented citations of the scientific works of Dr. Kandilarova are 85, 49 of which in journals with impact factor, mostly between 3 and 6, and one of the publications (*Kandilarova S, Stoyanov D, Kostianev S, Specht K. Altered Resting State Effective Connectivity of Anterior Insula in Depression. Front Psychiatry. 2018 Mar 15; 9:83*) is cited in a journal with IF 13.382.

Summary: The analysis of the data shows that the scientific output of the candidate is a result of the activity of a researcher, able to choose goals aimed at developing scientific knowledge in a particular field, to adequately determine the means for their implementation and to assess the place of the results obtained amongst the worldwide achievements in the field. Publications and citations in prestigious journals confirm the importance of her scientific research.

VI. Comprehensive, qualitative assessment of teaching activities, including scientific guidance of students, doctoral students, postgraduate students.

- 2014 – 2021 – participates in the practical training of students in medicine and dentistry
- 2015-2017 г. – holds lectures and practical exercises in a course on gerontopsychiatry of students from the Medical College, specialty "Nurse" and "Midwife"
- participates in the lecture course of medical students with multimedia presentation; develops and introduces exam tests for assessment in psychiatry for medical students
- 2014 – 2021 – conducts practicals for medical students in English and actively participates in ERASMUS trainings
- 2016 – 2020 – participates in the education of general practitioners
- 2021 – actively participates in the practical training of specializing doctors in psychiatry
- as can be seen from the academic report for the last 3 academic years, the teaching workload of Dr. Kandilarova is above the norm (over 200% on average)
- 2020 – organizes and conducts specialized theoretical and practical training for students and doctoral students in the methods of fMRI

- 2017-2021 – regulary trains students, PhD students and doctors in the methods for paradigm design and data processing by fMRI

Summary: The presented data give grounds to conclude that Dr. Kandilarova is a qualified and experienced teacher with skills to adapt the volume and level of complexity of the taught subject to the needs of the students. The proficiency in English language determines her effective participation in the teaching of foreign students.

VII. Critical remarks - none.

VIII. Overall assessment of the compliance of the candidate with the mandatory requirements and the mandatory National Minimum science-metrics indicators according to the Regulations for the implementation of the Law on Development of the Academic staff in the Republic of Bulgaria and the Regulation for occupying academic positions in the Medical University of Plovdiv

The analysis of the documents presented by Dr. Kandilarova for participation in the competition, including administrative documents and evidence for scientific and teaching activities fully comply with the mandatory conditions of the Law on the Development of the Academic staff in the Republic of Bulgaria, Regulations for the implementation of the Law and the Rules and regulations of the Medical University of Plovdiv, and the scientific publications and citations significantly exceed the mandatory scientometric indicators.

IX. Conclusion

The above made analysis allows me to conclude that the candidate fully meets the mandatory scientometric criteria and specific conditions for the academic position "Associate professor" and I confidently give a positive vote for awarding Dr. Sevdalina Sevdalinova Karaivanova – Kandilarova, PhD, with the academic position "ASSOCIATE PROFESSOR" in the scientific specialty "Psychiatry", for the Department of Psychiatry and Medical Psychology at the Medical University of Plovdiv.

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