

Review

From

Prof. d-r Radoslav Yosifov Georgiev, MD, PhD

Department of Diagnostic Imaging and Interventional Radiology, Head of the Magnetic Resonance Tomography Department, Medical University - Varna, Faculty of Medicine, habilitated in Professional Field 7.1. Medicine, Medical University - Varna, appointed as a member of the Scientific Jury in a competition for the position of Associate Professor in the specialty "Diagnostic Imaging", announced in the State Gazette, issue 15/21.02.2025.

Regarding: Announcement of a competition for the academic position of "Associate Professor" in the field of higher education 7. "Healthcare and Sports" in the professional field: 7.1 "Medicine" and the scientific specialty "Diagnostic Imaging", for the needs of the Faculty of Medicine, Department of Diagnostic Imaging and Interventional Radiology, Magnetic Resonance Tomography Department in Medical University Varna and Diagnostic Imaging Clinic in "St. Marina" university hospital Varna. The competition was announced in the State Gazette, issue 15 of February 21, 2025.

Information about the procedure:

After a meeting of the Faculty of Medicine at MU-Varna with protocol No. 37/ 31.03.2025 and pursuant to the order of the Rector of MU-Varna No. R-109-200/16.04.2025, I was appointed as a member of the scientific jury, and under protocol No. 1 of 30.04.2025, from a meeting of the Scientific Jury, I was elected to prepare a review.

Candidates: Only one candidate has submitted documents for participation in the competition

Chief Asst. Dr. Emilian Bozhidarov Kalchev, MD, PhD.

I present the following assessment as a member of the scientific jury for the above-cited competition, prepared in accordance with the requirements of the Law on Academic Affairs of the Republic of Bulgaria, the Regulations for its implementation and the Regulations for the development of the academic staff at the Medical University "Prof. Dr. Paraskev Stoyanov" - Varna.

I. Brief biographical data about the candidate:

Dr. Emilian Kalchev was born in 1986 in Targovishte, Bulgaria. In 2005 he graduated the Mathematics High School, Varna, and in 2011 - medicine at the Medical University - Varna. Since 2017, he has had a recognized specialty in diagnostic imaging. In 2019, he successfully defended his dissertation on the topic "Arterial spin labeling for assessment of cerebral perfusion in patients with microangiopathy" for the educational and scientific degree "doctor". Since 2012, he has been an assistant professor at the Department of Diagnostic Imaging and Radiotherapy of the Medical University - Varna, and since 2021 - chief assistant professor. Dr. Kalchev is a regular participant in the congresses of the Bulgarian Association of Radiology, European Congress of Radiology (ECR) in Vienna, European School of Radiology,

and has a short specialization - ILD Preceptorship Basel, Switzerland, 2024. He has active publication activity and participation in national and international forums.

Member of the Bulgarian Medical Union, the Bulgarian Association of Radiology, the European Society of Radiology, and MENSA.

Fluent in written and spoken English and German.

Married, with one child.

II. Scientific and research activities:

The attached academic reference for publications, citations, monographs, scientific profiles of the candidate for the competition for the position of Associate Professor - Dr. E. Kalchev, MD, includes:

1. Dissertation for the acquisition of the "Doctor" for the educational and scientific degree "Doctor" on the topic: "Arterial spin labeling for assessment of cerebral perfusion in patients with microangiopathy", Varna, 2019. 114 pages (indicator A1).
2. Full-text publications equivalent to a habilitation thesis in issues that are referenced and indexed in world-renowned databases of scientific information – 10 issues (indicator B4).
3. Publications and reports published in scientific journals, refereed and indexed in world-renowned databases with scientific information – 3 issues (indicator D7).
4. Publications and reports published in non-refereed journals with scientific review or published in edited collective volumes – 1 issue (indicator D8).

The total number of points covers the required standard. Dr. Kalchev has submitted 6 citations under this competition with a total number of points of 60 (indicator D10). The cited articles have been published only in international issues, which popularizes the scientific production of the Medical University - Varna.

In the attached documents, the candidate presents a certificate of participation in Bulgarian and international scientific forums with lectures and posters, which for the period 2019-2025 are 7 in number.

The candidate's total publication activity contains 26 scientific papers, of which 5 are related to the award of the academic title "Doctor" and 15 published after the award of the academic title "Doctor".

To participate in the announced competition, the following are submitted:

Full-text articles – 15 pcs.;

Published reports from scientific forums in Bulgaria and abroad – 0 pcs.;

Published summaries of reports from scientific forums in Bulgaria and abroad – 0 pcs.;

The distribution of the submitted publications according to the order of the candidate among the authors is as follows:

	Independent author	First author	Second author	Third and following author	total
Indicator B4 Full-text publications equivalent to a habilitation thesis in issues that are referenced and indexed in world-renowned databases of scientific information	4	1	1	4	10
Indicator D7 Publications and reports published in scientific journals, refereed and indexed in world-renowned databases with scientific information	3	–	–	-	3
Indicator D8 Publications and reports published in non-refereed journals with scientific review or published in edited collective volumes	1	-	-	-	1
Additional publications beyond the minimum scientometric requirements	1	–	-	-	1

Assessment of Contributions:

Dr. E. Kalchev shows a desire to introduce new methodologies in the field of diagnostic imaging, as well as improve already known applications, specifically in neuroradiology.

The main directions in Dr. Kalchev's research activities are related to the use of non-contrast magnetic resonance perfusion - Arterial spin labeling (ASL) MRI, the application of innovative approaches in the diagnosis of oncological, cardiovascular and pediatric diseases, as well as the development of medical education.

The use of ASL (arterial spin labeling) perfusion and 3D TOF angiography for rapid and non-contrast assessment of perfusion disorders in acute vascular events, asymptomatic ischemic disorders, and arteriovenous malformations is a clear example of the benefits of these innovations.

The presented scientific papers and the results of the research work of Chief Assistant Professor Emilian Bozhidarov Kalchev, MD, are thematically divided into the following scientific areas:

- **In direction 1: Arterial Spin Labeling (ASL) MRI in neuroradiology**

ASL magnetic resonance perfusion is a very promising method for quantitative and semi-quantitative rapid assessment of cerebral parenchymal perfusion. It involves endogenous labeling of arterial blood, without the need for contrast material – a great advantage in children, patients with renal failure and pregnant patients.

The research work is closely related to the clinical application of this technique and the search for certain perfusion features in specific brain pathology.

- a) A scientific, applied and methodological contribution is the original 5-point visual scale for general assessment of cerebral perfusion, through visual assessment of key brain regions, indication of intravascular artifacts and analysis of the general perfusion profile of patients with various diseases. This scale is very useful and shows a high IPR (Cohens kappa=0.82) and can serve for a quick and adequate assessment of patients with diffuse neurodegenerative diseases.
- b) Another scientific contribution is the introduction of a new conceptual model for ASL interpretation, in which regional hypoperfusion areas are assessed against the background of global perfusion status. The comparison of global and local perfusion assessment has an important role in the more accurate detection of dementias in the early phase.
- c) An important clinical contribution is the misdiagnosis of hypoperfusion areas in the medial occipital lobes and thalamus in patients with fetal posterior cerebral artery (fPCA). Rules and guidelines for avoiding such misinterpretations are outlined.
- d) Of interest is the study of the relationship between globally reduced CBF and prominent venous image on SWI sequences. The obtained data show a significant positive relationship between the two quantities and suggest the presence of hemodynamic compensatory mechanisms.
- e) Another very interesting study showed a relationship between ASL visibility of meningiomas and the location of these tumors in the skull. Meningiomas located around the skull base were significantly more likely to be visible on ASL MRI compared to those in other locations ($p < 0.001$), while tumor size, age, and gender did not show a significant correlation with ASL visibility.
- f) The role of ASL perfusion in a complex clinical case with the combination of arteriovenous malformation and glial tumor is presented, in which the perfusion technique directs the brain intervention in the right direction, and the obtained histological result shows the complexity of gliomas and the evolution in their classification, in which genetic markers are now leading.

• In direction 2: Diagnostic Imaging in Oncology

The subject of these studies are some of the most common oncological diseases such as prostate cancer, breast cancer and pancreatic cancer. Attention is paid to the correct diagnostic behavior in borderline cases, where generally accepted imaging indicators can be ambiguous, and the correctly selected diagnostic technique.

- a) The author draws attention to the role of PSAD (prostate specific antigen density) in patients with PIRADS 3 classified prostate lesions and the existence of a cut-off value of 0.12 ng/mL^2 with good sensitivity and specificity for separating high-risk from low-risk patients. This additional indicator may minimize the number of unnecessary biopsies and allow a personalized approach to the diagnosis of prostate diseases.
- b) Regarding breast cancer, Dr. Kalchev reveals in a publication the advantages of contrast-enhanced mammography in the evaluation of high-density mammary glands for occult carcinoma and as an alternative to the method with the highest sensitivity for detecting highly vascularized lesions such as MRI. The limited availability, high cost of MRI, some contraindications such as pacemakers, metal clips, incompatible prostheses contribute to the improvement and imposition of contrast-enhanced

mammography in the diagnosis of breast cancer and the follow-up of patients with medium and high risk.

- c) Another interesting publication describes a rare clinical case of solid pseudopapillary pancreatic tumor (Frantz tumor) in an elderly patient, with low malignant potential and excellent results after complex treatment. The role of MRI and PET-CT for preoperative evaluation and monitoring of the effect of treatment, as well as the differential diagnosis of possible recurrence with potential complications such as chronic indurative pancreatitis, areas of steatonecrosis, lipogranulomas and fibrosis, is discussed.

- **In direction 3: Pediatric Diagnostic Imaging**

This section contains two scientific publications on PRES syndrome and ileocecal intussusception in a patient with Burkitt's lymphoma. They emphasize the interdisciplinary approach and optimal imaging method in complex cases in the field of pediatric neurology and oncology.

- a) PRES is a relatively common phenomenon in pediatric neuroradiology, resulting from disorders in the posterior cerebral circulation and the permeability of the blood-brain barrier. Elevated blood pressure leads to endothelial dysfunction with hyperperfusion and vasogenic edema. It has been proven that a number of drugs used in the treatment of leukemia, such as cyclophosphamide, cisplatin, vincristine, methotrexate, can cause PRES, the so-called drug-induced. MRI is the optimal method that can make a differential diagnosis in the acute phase, prevent the progression of this significant complication and monitor the effect of the treatment.
- b) Intussusception in children is a relatively common pathology. In intussusception with atypical imaging features in a child, an underlying malignant process should always be considered. The author describes a case of a 7-year-old girl with abdominal pain, weight loss and iron deficiency anemia. Ultrasound demonstrated ileocecal intussusception, and CT also revealed lymphadenopathy. The surgical intervention performed with a favorable outcome proved Burkitt lymphoma.

- **In direction 4: Cardio-Vascular Diagnostic Imaging**

- a) A publication is presented that discusses the important role of CT with ECG synchronization for the detailed description of the anatomy, the presence of valve calcifications - important factors regarding preoperative planning in patients for transcatheter aortic valve implantation (TAVI). Annular calcinosis of the mitral annulus complicates interventions and endovascular treatment of valve diseases.

- **In direction 5: Medical Education and Interdisciplinary aspects**

In the digital era of Artificial Intelligence, personalized medicine is a modern approach to healthcare, in which medical treatment, prevention and diagnosis are adapted to the individual genetic, biochemical, physiological and behavioral characteristics of each individual patient. In three publications, the author draws attention to the problems of medical education and imaging diagnostics, the impact of the COVID-19 pandemic on the theoretical and practical training of young doctors, the importance of a personalized approach to the patient and modern aspects of learning modules and platforms.

- a) In one of the publications, Dr. Kalchev draws attention to the lagging behind of traditional radiology training in modern personalized medicine, emphasizing generally accepted synthesized knowledge, not including new digital technologies and the interdisciplinary approach. Outdated curricula, the non-inclusion of genetic, biochemical data, the underestimation of virtual reality, simulated PACS environments and the non-use of digital platforms are factors that we must necessarily correct if we want full integration and high quality of training, development of judgment and interpretation by young doctors.
- b) In another publication, the author examines the problems of medical education during the COVID-19 pandemic. In the context of a global health crisis and threat, along with reduced clinical approach and practical experience, the adaptability and resilience of young doctors, familiarization with innovative technologies are encouraged. A balance is needed for the effective development of modern healthcare.
- c) In an interesting interdisciplinary article, Dr. Kalchev draws attention to the cognitive and physiological aspects of auditory perception in the context of the burn-in phenomenon in audio engineering. The author emphasizes the important distinction between real physical changes in audio engineering and human factors that regulate our auditory perception.

III. Teaching and learning activities:

Dr. Emilian Kalchev has more than 12 years of teaching experience in the specialty of diagnostic imaging. Over the years, he has successively held various academic positions: assistant (2013-2021) and chief assistant (2021-2025). The spectrum of disciplines and specialties taught is in imaging diagnostics of the III, IV year of medicine BSE and ESE; as well as residents in diagnostic imaging at MU-Varna.

Dr. Kalchev regularly participates in the examination committee for Diagnostic Imaging for the specialty of medicine IV course English-language and Bulgarian-language training at MU-Varna.

Dr. Emilian Kalchev is a participant in the organizing committee and author of the poster of the XX Anniversary Congress of BAR 26-28.09.2024 in Albena.

IV. Clinical Work:

Dr. Emilian Kalchev has more than 13 years of experience as a radiologist and is actively involved in the daily work of the "Diagnostic Imaging" clinic of the University Hospital "St. Marina" Varna. He actively participates in the work and scientific projects of the clinic's nuclear magnetic resonance activity and as a consultant to the diagnostic imaging residents. He works as a leading diagnostic imaging specialist together with colleagues from the hospital's clinics, as well as with colleagues from all over the country.

V. Personal Impressions:

I have known Dr. Emilian Kalchev since he was a student, then a resident, doctoral student and assistant. A young and intelligent person who shows a conscientious attitude towards diagnostic work and patients, an insatiable thirst for knowledge, dialogic and uncompromising in his teaching activities and has the necessary capacity for scientific development.

VI. Conclusion:

Dr. Emilian Kalchev, MD, PhD is a young and promising radiologist with respectable experience in the clinical and scientific fields, with a certain contribution to the development of imaging diagnostics in our country, a dedicated teacher and tireless researcher.

Regarding the "Law and Regulations for the Development of Academic Staff in the Republic of Bulgaria" and the regulations of the Medical University "Prof. Dr. Paraskev Stoyanov"-Varna, I believe that Dr. Emilian Kalchev, MD fully meets the criteria for the title of "Associate Professor" and I strongly recommend that the esteemed members of the scientific jury award him the academic position of "Associate Professor" in the scientific specialty "Medical Radiology and Radiology (including the use of radioactive isotopes)" for the needs of the Department of Diagnostic Imaging and Interventional Radiology of the Faculty of Medicine of MU-Varna.

Date: 17.06.2025г.

City of Varna

Signature: _____

Prof. D-r Radoslav Georgiev, MD, PhD

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