

Opinion

From

Prof. Dr. Ara Garabed Kaprelian, MD, DSc

Medical University Varna,

Head of the First Clinic for Nervous Diseases

UMBAL "St. Marina" Varna

e-mail: ara.kaprelyan@mu-varna.bg / arakapri07@yahoo.co.uk

GSM: 0888745562

Internal member of the Scientific Jury according to

Order No. R-109-514/30.11.2023 of the Rector of the MU- Varna

by competition for the academic position "**PROFESSOR**" by field of higher education 7. Health care and sports, professional direction 7.1 Medicine and specialty "Diagnostic Imaging" one, 0.5 full-time position for the "Magnetic resonance tomography" department at the department "Diagnostic Imaging and interventional radiology", faculty "Medicine" MU-Varna and 1 full-time position for the "Diagnostic Imaging" Clinic at "Sveta Marina" UMBAL EAD - Varna, announced in SG No. 83/03.10.2023.

The review was compiled in accordance with the requirements of Art. 4, para. 2, Art. 29 a, para. 1 of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB) and Art. 6, para. 1, Art. 139, paragraph 1 and paragraph 3 of the Regulations for the Development of the Academic Staff at the Medical University - Varna.

One candidate has submitted documents for participation in the competition: **Associate Professor Dr. Radoslav Yosifov Georgiev, PhD**, Associate Professor in the scientific specialty "Diagnostic Imaging". The candidate has submitted all the necessary documents within the deadline, in accordance with the requirements of the LDASRB, the Regulations for its application and the Regulations for academic development at the MU - Varna.

1. Biographical data of the applicant:

Associate Professor Dr. Radoslav Yosifov Georgiev was born on 04/07/1976 in the town of Dobrich. He graduated in medicine in 2001 at the Sofia University. From 2002-2003 he was a clinical resident and specialist in Diagnostic Imaging at the MBAL, Dobrich. From

2003-2011 is an Assistant, Department of Diagnostic Imaging and Radiotherapy, Medical University "Prof. Dr. Paraskev Stoyanov" - Varna. In the period 2003-2007, he specialized in Diagnostic Imaging at the Medical University of Varna. Since February 2008, there has been a recognized specialty in Diagnostic Imaging. From 2012 to 2015, he was a doctoral student at the Department of Diagnostic Imaging, Medical University Varna. In May 2015, after a successfully defended dissertation on the topic "Magnetic resonance diffusion and perfusion for differentiation and evaluation of primary glial brain tumors", he was awarded the educational and scientific degree "Doctor" in the specialty "Medical Radiology and roentgenology (including use of radioactive isotopes)" from MU-Varna. From 2011-2016 is a Chief Assistant, Department of Diagnostic Imaging, Medical University "Prof. Dr. Paraskev Stoyanov" - Varna.

From December 2016, ch. assistant Dr. Radoslav Georgiev was awarded AP "associated professor" in the scientific specialty "Diagnostic Imaging", department "Diagnostic Imaging, interventional radiology and radiotherapy", Medical University "Prof. Dr. Paraskev Stoyanov" - Varna. From 2020 - to 2023 is a Head of the Diagnostic Imaging Clinic at "Sveta Marina" UMBAL EAD, Varna.

Assoc.Prof. Dr. Georgiev has participated in numerous prestigious educational courses in Austria, Germany, Spain, Italy, Belgium, Greece, Turkey, Hungary and Switzerland, among which stand out the ECONR course "Pierre Lasajunias" of the European Society of Neuroradiology in Tarragona Spain and Rome Italy, Magnetic Resonance Imaging Specializations at Ankara Hacettepe University and Ioannina University Hospital.

He is a member of the Bulgarian Association of Radiology, the European Society of Radiology, and the European Society of Neuroradiology. Chairman of the upcoming XX Congress of the Bulgarian Association of Radiology. He is fluent in written and spoken English, German, and Russian.

2. Expert activity:

- President of the 20th Congress of the Bulgarian Association of Radiology (BAR) 2024, Albena;
- Lecturer at the Academy of Molecular Pathology and Personalized Medicine "Brain Tumors" 2023, Varna;
- Participation in the state examination commission for the specialty "Diagnostic Imaging" 2020, 2021, 2022, 2023 at MU-Pleven.
- Expert educational activities in an expert group in a scientific project: Project No. BG05M2OP001-2.016-0025 "Creation of a multi-disciplinary educational environment for

the development of personnel with integral competencies in the field of biomedicine and healthcare", under the EP "Science and education for intelligent growth" .

- Expert in an expert group in a scientific project "Physical breast anthropomorphic models and technology for their production", (PHENOMENO), No. 101008020, under EP "Horizon 2020" to the EC.
- Member of the Scientific Committee of the XIX Congress of the Bulgarian Association of Radiology (BAR) 2022, Plovdiv; Member of the organizing committee of Balkan MR - 5th Magnetic Resonance Balkan Outreach Program 2019, Sofia; Chairman of the local committee of the XVIII Congress of the Bulgarian Association of Radiology (BAR) 2019, Varna; Member of the Scientific Committee of the XVII Congress of the Bulgarian Association of Radiology (BAR) 2017, Plovdiv;
- Reviewer of project No. 22006, 2022 "Clinical manifestations, functional disorders and computed tomography findings in long-term COVID-19", headed by Assoc. Dr. Darina Nikolova Miteva-Mihailova, funded by the "Science" fund at the Medical University - Varna.
- National delegate of the Bulgarian Association of Radiology (BAR) in the ESR Quality, Safety and Standards Committee (QSSC). ECR 2020, Vienna, Austria; National delegate of the Bulgarian Association of Radiology (BAR) in the ESR Quality, Safety and Standards Committee (QSSC). ECR 2019, Vienna, Austria;
- Lecturer in the 2019 International course MRI and US examination of the musculoskeletal system, Pravets; Lecturer at the First Summer School on Stroke 2019, MU Varna, Varna;
- Member of the scientific jury for the awarding of the ONS "Doctor" at the University of Varna (2019), candidate Dr. Emilian Kalchev; Member of the scientific jury in the competition for the academic position "Associated professor" in the Medical University of Varna (2018), candidate Dr. Chavdar Hristov Bachvarov, MD; Member of the scientific jury in the competition for the academic position "Professor" for the University of Varna (2018), candidate Assoc.prof. Dr. Elitsa Encheva-Mitsova, MD.
- Case expert from judicial practice:
- Reviewer of the Bulgarian edition of Torsten Möller, Emil Reif. Taschenatlas Einstelltechnik: Röntgendiagnostik, Angiographie, CT, MRT. Stuttgart, Georg Thieme Verlag, 2004. 334 pp. : Torsten Möller, Emil Reif. Pocket atlas-working techniques: X-ray diagnostics, angiography, computed tomography, magnetic resonance tomography. Varna, STENO-Varna, 2006, edited. of Prof. Dr. Boyan Balev, MD, Dr. Dilyana Baleva.

3. Evaluation of the candidate's scientific works and publications submitted for participation in the competition:

Assoc. Dr. Radoslav Yosifov Georgiev, PhD presents a total of **143** scientific papers, of which **91** are related to the awarding of the academic position "Associate Professor" and **53** published afterwards, including: Full text articles - 44, Published reports from scientific forums at home and abroad – 2, Published summaries of reports from scientific forums at home and abroad - 7

The scientific output of Assoc.Prof. Georgiev, covering the minimum scientometric requirements for occupying the academic position "professor", is as follows: Dissertation work for obtaining the educational and scientific degree "doctor" - 1, Scientific publications referenced and indexed in world-renowned databases with scientific information - 11, Publications in scientific publications, referenced and indexed in world-famous databases with scientific information - 3, Publications in non-refereed peer-reviewed journals or published in edited collective volumes - 29, Citations or reviews in scientific publications, referenced and indexed in world-famous databases with scientific information or in monographs and collective volumes - 7.

The scientific works presented, equivalent to a habilitation thesis, show a variety of scientific interests, primarily related to neuroradiology and the establishment of magnetic resonance imaging as a basic method in neuro-oncology.

The main scientific direction is brain tumors, specifically gliomas - with an emphasis on the relationship of genetic markers of tumors with specific imaging characteristics, the possibilities of evaluating the extent of gliomas and assessing the therapeutic response. The author points to magnetic resonance diffusion (DWI) and perfusion (PWI) as the main magnetic resonance imaging techniques that can differentiate gliomas from other lesions - such as strokes, lymphoma, metastases, detect the early transformation of low-grade to high-grade gliomas, before the presence of post-contrast enhancement, to assess tumor spread, tumor progression, to indicate the ideal biopsy site and to assess therapeutic response.

The author's work on artificial intelligence and its application in imaging, specifically for the evaluation of lumbar stenosis, is current and very interesting. The advent of radiomics and artificial intelligence are a challenge that opens up new horizons independent of the human eye alone. Comparing the results between the work of the radiologist with and without the help of artificial intelligence is important in view of the future collaborative diagnostic activity for the benefit of the patient.

The presented scientific works and the results of the research work of Assoc. prof. Dr. Radoslav Yosifov Georgiev, MD. are distinguished in the following scientific directions:

- **Neuroradiology**

Most of the scientific works and the research work of Assoc.Prof. Georgiev are related to neuroradiology.

a. The author shows the role of magnetic resonance imaging in the assessment of the tumor after radiotherapy, including the side and unwanted effects, the follow-up over time of such patients. Mandatory inclusion in the magnetic resonance protocol of diffusion and perfusion help to differentiate radiation necrosis more accurately from tumor recurrence. The author examines the moderate radiosensitivity of brain PNET (primitive neuro-ectodermal tumor) and the possibilities for a more successful therapeutic effect through hyperfractionated craniospinal radiotherapy in combination with chemotherapy and subsequent bone marrow transplantation of peripheral stem cells.

b. Contrast-enhanced magnetic resonance imaging of the head and neck is the method of choice, according to the author, for the detection of leptomeningeal metastases, as well as for proving a possible link for metastasis via the lymphatic route through the newly discovered glial lymphatics, the so-called glymphatic system. The author also points to another example of extracranial metastasis in the neck region in a patient with glioblastoma, also looking at the role of the glymphatic system as a potential pathway for tumor dissemination.

c. The author has studied gliomagenesis, imaging characteristics and structure of gliomas in several scientific publications. He is interested in the new WHO classification of brain tumors, describes their rarer variants, investigates together with pathologists the genetic and pathological structure of gliomas and looks for their possible connection with magnetic resonance imaging features. The author investigated the role in gliomagenesis of the Diaph3 gene, encoding a protein that stabilizes the cytoskeleton, which, based on its different expression, can be used to differentiate normal brain parenchyma from reactive gliosis and tumor proliferation, as well as to predict response to certain chemotherapeutics. Assoc.prof Georgiev draws attention to the difficult differential diagnosis between pleomorphic xanthoastrocytoma and giant cell glioblastoma due to the overlap of histological, immunohistochemical criteria and imaging features. The author describes a rare localization of DNET (dysembryoplastic neuroepithelial tumor) – a complex variant in the cerebellum with atypical clinical and radiological features – such as gait instability, strabismus, and a cystic-solid structure with contrast enhancement.

d. Assoc. Prof. Georgiev researches the role of MRI in the differential diagnosis of demyelinating diseases - multiple sclerosis, transverse myelitis, Lyme disease with other pathology, monitoring the effect of treatment and the presence of activity. In rare cases, he also describes a possible combination of different diseases in one patient. Participated as a co-author in the introduction of software techniques to estimate the volume of multiple sclerosis lesions in the brain parenchyma and look for correlation with the severity of the disease. The author points to magnetic resonance imaging as an important tool for early detection of encephalitis, especially with the diffusion technique, clarifying that the often-described changes are non-specific and require a wider differential diagnosis.

e. The use of non-contrast ASL (arterial spin labeling) magnetic resonance perfusion for the evaluation of asymptomatic cerebrovascular disorders, microangiopathy and arteriovenous malformations is innovative and socially significant. The author examines the magnetic resonance findings in patients with dementias - Alzheimer's disease, etc., emphasizing the physiological assessment through non-contrast ASL (arterial spin labeling) perfusion to detect early hemodynamic disorders, and not only the morphological assessment of brain atrophy.

f. Assoc. Prof. Georgiev contributes with new cases of relatively rare and newly discovered diseases - such as CLIPPERS syndrome, a rare, still poorly understood disease with very characteristic magnetic resonance imaging characteristics, which, in combination with clinic, follow-up and histology, can recognize the disease and contribute to understanding its etiology, pathogenesis and prognosis.

g. Assoc. Prof. Georgiev shares cases from clinical practice of a combination of apparently random diseases and looks for a possible cause-and-effect relationship between the different disease entities, such as syringomyelia and neuropathic arthropathy.

- **Tumors of Head and Neck**

a. Assoc. Prof. Georgiev describes magnetic resonance imaging as the method of choice for the detection and staging of nasopharyngeal carcinoma, due to its exceptional soft tissue resolution, sensitivity to perineural and intracranial spread, and assessment of bone marrow for possible infiltration. He also presents a case of advanced achromatic sinonasal melanoma, with an excellent outcome after combined treatment, without complications such as radiation-induced optic nerve demyelinating syndrome, thanks to the high radiosensitivity of this tumor variant.

b. Assoc. Prof. Georgiev describes the potential complications of the seemingly simple manipulation for taking nasopharyngeal secretions, which has gained popularity in connection with the COVID-19 pandemic, one of which is a brain rhinogenic abscess.

c. In several publications, the author describes rare syndromes and diseases such as proliferative trichilemmal cysts of the scalp, which can mimic squamous cell carcinoma due to cellular atypia and so-called "empty nose" syndrome, described as a paradoxical sensation of nasal obstruction in the presence of actual dilated nasal airways, resulting from the dissociation of efferent neuronal signaling accompanying changes in the nasal mucosa. The author also describes a rare localization of a giant cell tumor in the sinonasal region and discusses the complex approach to treatment, which includes, in addition to surgery, postoperative radiotherapy, with a good outcome for the patient. The author also reports a case of Ritscher-Schinzel (RTSC) syndrome, also known as 3C (cranio-cerebellar-cardiac) syndrome, a rare disorder with a variable spectrum of CNS (predominantly cerebellar), craniofacial, and congenital heart defects in which retardation is also observed in growth, most likely due to isolated growth hormone deficiency.

- **Oncology**

a. Assoc. Prof. Georgiev studies locally advanced chordomas in the lumbo-sacral and paravertebral areas, emphasizing the role of magnetic resonance imaging, pathohistological and immunohistochemical analysis for the exact diagnosis, the radio resistance of this tumor and the prognosis, which is closely related to the histological variant - poor in rhabdoid and the anaplastic variants. The author describes a case of giant cell tumor of the sacrum, a borderline, locally aggressive tumor in which radiotherapy is not routinely used because of the increased risk of secondary neoplasms in young people, as well as the risk of cellular transformation to sarcoma, but appropriate for incomplete resection and relapse.

b. Assoc. Prof. Georgiev also draws attention to the peculiarities of the course of COVID-19 in cancer patients, who have a weakened immune system due to radiation-chemotherapy. Describes an atypical clinical and laboratory presentation: cough without fever, uroinfection with hematuria, gastrointestinal symptoms, leukopenia, and diffuse bilateral peripheral and subpleural "ground-glass" changes, more in the lower lobes on computed tomography of the lungs. Chest CT does not have full sensitivity, especially early in the infection, where over 50% may be negative. The author and his team show the role of combined targeted therapy and radiosurgery in a patient with advanced non-small cell lung adenocarcinoma with brain metastases, who, despite the covid 19 infection, achieved a 3-year survival with local tumor control and good quality of life.

c. The author reports a case of a very rare tumor - an extremely malignant rhabdoid signet-ring GIST - the third case described in the English medical literature. Its diagnosis requires expert pathohistological and immunohistochemical evaluation to determine the differential diagnosis with several other malignant mesenchymal tumors.

d. Assoc. Prof. Georgiev considers the LI-RADS system as a means of categorizing findings in patients with a high risk of developing hepatocellular carcinoma. Even with the correct application of LI-RADS, for a finding defined as LR-5 there remains a 5% probability that the histological diagnosis is different from HCC - specifically in one clinical case - MALT lymphoma - low-grade B-cell lymphoma of the mucosa - associated lymphoid tissue.

e. Together with fellow radiation therapists Assoc. Prof. Georgiev examines the modern VMAT and IGRT radiation techniques for the treatment of vulvar carcinoma with their advantages - significant reduction of doses in the small intestine, rectum, bladder, and femur, also describing the role of MRI in determining the most important prognostic factor in this disease - the nodal status.

- **Gastroenterology**

a. Assoc. Prof. Georgiev in several scientific works pays attention to the diagnosis and follow-up in patients with Crohn's disease, pointing out the importance of low-dose CT enterography in the conditions of dual energy mode and magnetic resonance diffusion, perfusion with dynamic contrast to assess inflammatory changes in the intestinal wall and the mesentery.

b. The author describes adenomyomatosis of the gallbladder - a benign degenerative condition of the gallbladder characterized by mucosal proliferation and thickening of the muscular layer and the entire wall and emphasizes cholecystectomy as the first method of treatment due to the premalignant nature, especially of the segmental and diffuse type adenomyomatosis in patients with pronounced clinical symptoms.

c. Assoc. Prof. Georgiev shows the role of magnetic resonance cholangio-pancreatography in the diagnosis of liver abscesses and the proof of a possible connection between the abscesses and the biliary tree, detection of important concomitant pathology such as strictures, gallstones, tumors, and secondary hepatic lesions.

- **Cardiology**

a. The author presents the possibilities of magnetic resonance imaging of the heart for morphological and functional assessment in various heart diseases and the possibility of differential diagnosis through tissue suppression techniques (double and triple inversion-recovery) between myxoma and lipoma.

b. The author also shares a case from the practice of a cardiotoxic effect in a patient treated with 5-fluorouracil, and the frequency of these effects can reach 20%. Specifically, it is about a chemotherapy patient with acute toxic myocardial damage with involvement of both chambers and development of cardiogenic shock, with complete reversal within 7 days of systolic dysfunction.

- **Muskulo-skeletal diagnostic imaging**

a. Assoc. Prof. Georgiev participated as a leading researcher in a unique for the country study of the role of artificial intelligence in diagnostic imaging by investigating the level of correspondence between magnetic resonance readings of the lumbar spine, created by a neural network for deep learning (CoLumbo) and readings of radiologists. The implementation of such AI-based tools in practice would most accurately predict the presence of stenosis. This would lead to timely and effective surgical treatment and improved quality of life for these patients.

b. Assoc. Prof. Georgiev draws attention to the diagnosis of spondyloarthropathies - a heterogeneous group of immune-mediated inflammatory arthritis affecting the spine, Sacroiliac joints, and peripheral joints, describing the key role of MRI in the detection of sacroiliitis in the early stages of the disease, much early from the x-ray examination.

c. Assoc. Prof. Georgiev describes the features of the magnetic resonance image of the child's knee, considering anatomical variants, variants of red bone marrow distribution, additional centers of ossification, irregular ossification, etc. conditions that may mimic pathology.

d. The author also discusses bone hemangiomas, specifically in the long bones and tibia, describes the differential diagnosis and imaging features, and the role of radiation therapy in inoperable cases.

e. Prof. Georgiev also contributes methodological innovations by examining 382 patients in three different centers with magnetic resonance imaging of the lumbar spine for the presence of central stenosis at all lumbar levels. It takes an interesting comparative approach to the performance of artificial intelligence, comparing the accuracy of measurements for lumbar stenosis of a radiologist using the software with the accuracy of a radiologist not using the software and the accuracy of the artificial intelligence (AI) algorithm itself. The study showed that the radiologist using the CoLumbo software achieved the best results. The algorithm's results were lower, but still better, than radiologists who did not use the software in any published study.

f. The practical use of software applications such as CoLumbo can be considered an applied clinical-diagnostic contribution that leads to a reduction in the time required to read MRI without reducing the accuracy of the final report. This prospective study demonstrated the performance evaluation of the software showing very good sensitivity, specificity, positive and negative predictive values.

Associate Professor Georgiev participated as an expert in two scientific projects, financed respectively by the Operational Program "Science and Education for Intelligent Growth and the Horizon 2020 Program of the European Commission. (certificate 110-1811/16.10.2023).

4. Educational and teaching activity of the applicant:

Assoc. Prof. Radoslav Georgiev has been teaching Diagnostic Imaging at MU-Varna for more than 20 years. The specialties are the following: Diagnostic imaging of the III, IV course of medicine in Bulgarian and English; X-ray laboratory technician specialty; specialty rehabilitator; specialty kinesytherapist; specialty nurse; specialty of midwifery, as well as specialists in diagnostic imaging at MU-Varna.

His study load in the last two academic years exceeds 100 study hours. Associate Professor Georgiev supervised two doctoral students who successfully defended theses for the acquisition of the educational and scientific degree "doctor" (certificate 109-862 dated 24.10.2023). From the date of acquiring a 5-year internship in the specialty of Diagnostic Imaging, associate professor Georgiev has supervised 7 doctors specializing in Diagnostic Imaging.

5. Clinical work of the applicant:

Assoc. Prof. Georgiev has more than 20 years of work experience as a radiologist and actively participates in the daily work of the "Diagnostic Imaging" clinic of "Sveta Marina" UMBAL Varna. For the period 2020-2023, he is the head of the clinic. He actively participates in the work of the clinic's nuclear magnetic resonance activity and as a consultant in the hospital committees for pediatric oncohematology, brain tumors, hematology, etc. He works conscientiously and responsibly as a leading specialist in diagnostic imaging together with colleagues from the hospital's clinics, as well as with colleagues from all over the country.

6. Critical notes to the applicant:

No critical notes

7. Conclusion:

Assoc. Dr. Radoslav Georgiev, PhD, is an established and proven teacher, researcher, and specialist radiologist with authority in scientific circles. The documents, publications, citations, and evidentiary material presented in the competition convincingly show that the candidate fully meets the criteria for scientific and teaching activity for the occupation of the academic position "Professor", in accordance with the requirements of LDASRB, the Rules for Application of LDASRB, as well as the Regulations for Academic Development at the MU - Varna.

Based on the above facts, **I give my positive vote** and warmly recommend the respected members of the Scientific Jury to award to **Assoc. Prof. Dr. Radoslav Yosifov Georgiev, MD**, the academic position "**Professor**" in the field of higher education 7. "Health and Sports", professionally direction 7.1. Medicine and specialty "Diagnostic Imaging" one, 0.5 full-time position for the Department of "Magnetic resonance imaging" at the department "Diagnostic Imaging and interventional radiology", faculty "Medicine" of the Medical University of Varna and 1 full-time position for the "Diagnostic Imaging" clinic at UMBAL "Sveta Marina" EAD - Varna.

Varna city
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Prepared the opinion:
Prof. Ara Kaprelyan, MD, MSc

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