

## **OPINION**

From

Prof. Dr Nikoleta Ivanova Traykova, MD,

Medical University – Plovdiv,

Head of Diagnostic Imaging department in St. George hospital Plovdiv,

Chairman of Bulgarian Association of Radiology (BAR),

**External 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.

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".

### **1. Biographical data for the applicant:**

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

From 2003–2011 - 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, he has 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 - 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 - Head of the Diagnostic Imaging Clinic at "Sveta Marina" UMBAL EAD, Varna. Associate Professor Dr. Georgiev has periodically increased his qualifications in numerous educational courses in Austria, Germany, Spain, Italy, Belgium, Greece, Turkey, Hungary and Switzerland, among which we will note the ECONR course "Pierre Lasajunias" of the European Society of Neuroradiology in Tarragona Spain and Rome Italy, the Magnetic Resonance Imaging Specializations at Hacettepe University in Ankara 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;

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 2019 and ECR 2020, Vienna, Austria;

- 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 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:

Forensic medical examination according to the civil case 1609/2019, GO-I-20 composition of the SCC. Appointed expert by the Ministry of Health.

Administrative case No. 780/2018 of the Administrative Court of Dobrich.

DP No. 251-3M-177/2016 according to the inventory of the Office of the Ministry of Internal Affairs, Burgas. Five-member forensic examination.

- Member of the Scientific Committee of the XVII Congress of the Bulgarian Association of Radiology (BAR) 2017, Plovdiv;

- 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:

1. Indicator A1: Dissertation work for obtaining the educational and scientific degree "doctor" - 1
2. Indicator C4: Scientific publications referenced and indexed in world-renowned databases with scientific information - 11
3. Indicator D7: Publications in scientific publications, referenced and indexed in world-famous databases with scientific information - 3
4. Indicator D8: Publications in non-refereed peer-reviewed journals or published in edited collective volumes – 29
5. Indicator E10: Citations or reviews in scientific publications, referenced and indexed in world-famous databases with scientific information or in monographs and collective volumes – 7

<b>Independent author</b>	<b>First author</b>	<b>Second author</b>	<b>Third and more author</b>	<b>Total</b>
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**Indicator C4**

Publications in publications  
referenced in world-renowned  
databases of scientific  
information, equivalent to a  
habilitation thesis - 1 3 7 11

**Indicator D7**

Publications and reports in  
scientific publications, referenced  
and indexed in world-renowned  
databases with scientific  
information 2 - - 1 3

**Indicator D8**

Publications and reports in non-  
refereed peer-reviewed journals or  
edited collective volumes - 3 15 11 29

**Additional**

publications beyond the minimum  
scientometric requirements - - 7 3 10

**Table 1. Distribution of author positions in scientific works**

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 gliomas - assessment of grade, assessment of therapeutic response, as well as the relationship of genetic markers of tumors with specific imaging characteristics. The author draws attention to magnetic resonance diffusion (DWI) and perfusion (PWI) as the main magnetic resonance imaging techniques that can differentiate gliomas from other lesions - strokes, lymphoma, metastases, assess the extent of gliomas, detect early transformation of low-grade to high-grade gliomas, before the presence of postcontrast enhancement, to assess tumor spread, tumor progression, indicate the ideal site for biopsy, and assess therapeutic response.

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

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

- **Neuroradiology**

Most of Assoc. Prof. Georgiev's research work is related to neuroradiology.

- a) The author describes 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 cases with radiation necrosis from tumor recurrence and the phenomena of pseudoprogression. The author examines and discusses the moderate radiosensitivity of brain PNET (primitive neuro-ectodermal tumor) and the possibilities of overcoming it by hyperfractionated craniospinal radiotherapy in combination with chemotherapy and subsequent bone marrow transplantation of peripheral stem cells.
- b) The author draws attention to the role of contrast-enhanced magnetic resonance imaging of the head and neck for the detection of leptomeningeal metastases, as well as a possible link to metastasis via the lymphatic route through the newly discovered glial lymphatics, the so-called glymphatic system. The author reports a case of extracranial cervical metastasis in a patient with glioblastoma, addressing the role of the glymphatic system as a potential pathway for tumor dissemination.
- c) In a series of publications, the author investigates gliomagenesis, imaging characteristics and structure of gliomas. 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. The author also points out the difficult differential

diagnosis between pleomorphic xanthoastrocytoma and giant cell glioblastoma due to the significant 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 also draws attention to 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 for evaluating the volume of multiple sclerosis lesions in the brain parenchyma and 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) An important direction in the author's works is the work with non-contrast ASL (arterial spin labeling) magnetic resonance perfusion for the evaluation of asymptomatic cerebral vascular disorders, microangiopathy and arterio-venous malformations. The author examines the magnetic resonance findings in patients with dementias - Alzheimer's disease, etc., emphasizing the physiological assessment by means of 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, rather a diagnosis of exclusion, but sometimes with very characteristic magnetic resonance imaging characteristics, which, in combination with clinic, follow-up and histology, can recognize the disease and contribute to the understanding of its etiology, pathogenesis and prognosis.

g) The author describes interesting cases from clinical practice of a combination of seemingly random diseases and looks for a possible causal relationship between the different disease entities, such as syringomyelia and neuropathic arthropathy.

- **Tumors of head and neck:**

a) The author points to magnetic resonance imaging as the method of choice for the detection and staging of nasopharyngeal carcinoma because of its exceptional soft tissue resolution,

sensitivity to perineural and intracranial spread, and assessment of bone marrow for possible infiltration. The author presents a case of advanced achromatic sinonasal melanoma, with an excellent outcome after combined treatment, without complications of the type of radiation-induced optic nerve demyelinating syndrome, thanks to the high radiosensitivity of this tumor variant.

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

c) The author contributes interesting cases of rare syndromes and diseases such as proliferative trichilem cysts of the scalp, which can mimic squamous cell carcinoma due to cellular atypia, etc. empty nose syndrome, described as a paradoxical sensation of nasal obstruction in the presence of actually enlarged nasal airways, resulting from the dissociation of the efferent neuronal signal 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) In a series of publications, the author examines locally advanced chordomas in the lumbosacral and paravertebral regions, emphasizing the role of magnetic resonance imaging, pathohistological and immunohistochemical analysis for the accurate diagnosis, the radioresistance of this tumor and the prognosis closely related to the histological variant - bad in rhabdoid and 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) Associate Professor Georgiev also draws attention to the peculiarities of the course of COVID-19 in patients with oncological diseases 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 contributes a reported case of a very rare tumor - an extremely malignant rhabdoid gastrointestinal stromal tumor with a mixed subtype of rhabdoid signet-ring GIST - the third reported case in the English medical literature. Its diagnosis requires expert pathohistological and immunohistochemical evaluation to determine the differential diagnosis with a number of other malignant mesenchymal tumors.

d) The author discusses the application of the LI-RADS system for categorizing findings in patients at 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 - the associated lymphoid tissue.

e) The author reviews the modern radiotherapy techniques VMAT and IGRT for the treatment of vulvar carcinoma with their advantages - a 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) In a series of publications, Assoc. Prof. Georgiev 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 intestinal wall and mesentery.

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

c) 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 is described.

- **Cardiology:**

a) The role 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 are presented.

b) Possible cardiotoxic effects have been described with 5-fluorouracil treatment, and the incidence of these effects may reach 20%. Specifically, we are talking 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) The author participated in a country-unique study of the role of artificial intelligence in diagnostic imaging, investigating the level of correspondence between the magnetic resonance readings of the lumbar spine, created by a deep learning neural network (CoLumbo) and the radiologists' readings. 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) Attention is paid to the diagnosis of spondyloarthropathies - a heterogeneous group of immune-mediated inflammatory arthritis affecting the spine, sacro-iliac joints and peripheral joints, describing the key role of MRI in the detection of sacroiliitis in the early stages of the disease, much more -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 distribution of red bone marrow, additional centers of ossification, irregular ossification, etc. conditions that may mimic pathology.

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

e) In addition to theoretical contributions, Assoc.Prof. Georgiev 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. The author 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) As an applied clinical-diagnostic contribution, I consider the practical use of software applications such as CoLumbo, which leads to a reduction in the time required to read MRI, without reducing the accuracy of the final report for some pathologies and improving it in others. This prospective study consistently 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:**

Assoc.Prof. Radoslav Georgiev has more than 20 years of teaching experience in the field of diagnostic imaging. The range of disciplines and specialties taught is wide: diagnostic imaging for the III, IV course of medicine in Bulgarian and English; X-ray laboratory technician specialty; specialty rehabilitator; specialty kinesitherapist; 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 seven doctors specializing in Diagnostic Imaging.

#### **5. Critical Notes:**

I have none of these.

#### **6. Conclusion:**

**Assoc. Dr. Radoslav Yosifov Georgiev, PhD**, is an established teacher, researcher and specialist in the radiology community in our country. The documents, publications, citations and evidentiary material submitted in the competition convincingly show that **Assoc. Dr. Radoslav Georgiev meets the requirements** for scientific and teaching activity for the occupation of the academic position "**Professor**", in accordance with the requirements of LDASRB, the Regulations for Application of LDASRB, as well as and 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. 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.

**Plovdiv**

**12.02.2024**

**Prepared the opinion:**

**Prof. d-r Nikoleta Traykova, MD, PhD**

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