

EISSN 1305-3612

DIR


Diagnostic and Interventional Radiology

TSR
1924
TURKISH SOCIETY
OF RADIOLOGY

dirjournal.org

VOLUME 32
ISSUE 4
July 2026

Editor in Chief

 Şükrü Mehmet Ertürk, MD


Department of Radiology, İstanbul University Faculty of Medicine, İstanbul, Türkiye

E-mail: smerturk@gmail.com

ORCID ID: 0000-0003-4086-675X

Section Editors and Scientific Editorial Board

Abdominal Imaging

 İlkey S. İdilman, MD

Department of Radiology, Hacettepe University Faculty of Medicine, Ankara, Türkiye

E-mail: ipolater@yahoo.com

ORCID ID: 0000-0002-1913-2404

 Sonay Aydın, MD

Department of Radiology, Erzincan Binali Yıldırım University Faculty of Medicine, Erzincan, Türkiye

E-mail: sonay.aydin@erzincan.edu.tr


ORCID ID: 0000-0002-3812-6333

 Oğuz Dicle, MD

Dokuz Eylül University Faculty of Medicine, Department of Radiology, İzmir, Türkiye

E-mail: odicle59@gmail.com

ORCID ID: 0000-0001-5269-4903

 Nurullah Dağ, MD

İnönü University Faculty of Medicine, Department of Radiology, Malatya, Türkiye

E-mail: nurullah.dag@inonu.edu.tr, drndag@icloud.com

ORCID ID: 0000-0002-9342-0244

Artificial Intelligence and Informatics

 Tuğba Akıncı D'Antonoli, MD

Division of Diagnostic and Interventional Neuroradiology, Department of Radiology, University Hospital Basel, Basel, Switzerland

Department of Pediatric Radiology, University Children's Hospital Basel, Basel, Switzerland

E-mail: tugba.akincidantonoli@unibas.ch

ORCID ID: 0000-0002-7237-711X


 Ulaş Bağcı, PhD

Northwestern University Faculty of Medicine, Department of Radiology, Chicago, United States

E-mail: ulas.bagci@northwestern.edu

ORCID ID: 0000-0001-7379-6829


Breast Imaging

 Serap Gültekin, MD

Department of Radiology, Gazi University Faculty of Medicine, Ankara, Türkiye

E-mail: sergultekin@yahoo.com

ORCID ID: 0000-0001-6349-3998


 Işıl Başara Akın, MD

Dokuz Eylül University Faculty of Medicine, Department of Radiology, İzmir, Türkiye

E-mail: isilbasara@gmail.com

ORCID ID: 0000-0002-0786-1490

Chest and Cardiovascular Imaging


 Furkan Ufuk, MD

Department of Radiology, The University of Chicago, Chicago, United States of America

E-mail: furkan.ufuk@hotmail.com

ORCID ID: 0000-0002-8614-5387

Hybrid Imaging and Nuclear Medicine

 Zeynep Gözde Özkan, MD

İstanbul University Faculty of Medicine, Division of Nuclear Medicine, Department of Internal Medicine, İstanbul, Türkiye

E-mail: zeynep.ozkan@istanbul.edu.tr, zgozdeozkan@yahoo.com

ORCID ID: 0000-0003-0360-358X


Interventional Radiology

 Barbaros Çil, MD, FCIRES

Department of Radiology, Koç University School of Medicine, İstanbul, Türkiye

E-mail: bcil@ku.edu.tr

ORCID ID: 0000-0003-1079-0088

 Bahri Üstünsöz, MD

Department of Radiology, LSUHSC (Louisiana State University Health Science Center) School of Medicine, New Orleans, United States

E-mail: bustunsoz2000@yahoo.com

ORCID ID: 0000-0003-4308-6708

 Onur Taydaş, MD

Sakarya University Faculty of Medicine, Department of Radiology, Sakarya, Türkiye

E-mail: onurtaydas@sakarya.edu.tr, taydasonur@gmail.com

ORCID ID: 0000-0002-9881-7240

Musculoskeletal Imaging

 Zeynep Maraş Özdemir, MD

Department of Radiology, İnönü University Faculty of Medicine, Malatya, Türkiye

E-mail: zynpmaras@yahoo.com

ORCID ID: 0000-0003-1085-8978


Neuroradiology

 Erkan Gökçe, MD

Department of Radiology, Tokat Gaziosmanpaşa University Faculty of Medicine, Tokat, Türkiye

E-mail: drerkanogkce@gmail.com


ORCID ID: 0000-0003-3947-2972

 Suzan Şaylısoy, MD

Eskişehir Osmangazi University Faculty of Medicine, Department of Radiology, Eskişehir, Türkiye

E-mail: ssaylisoy@ogu.edu.tr

ORCID ID: 0000-0002-1560-964X


 Gökçen Çoban, MD

Hacettepe University Faculty of Medicine, Department of Radiology, Ankara, Türkiye

E-mail: drgokcencoban@gmail.com

ORCID ID: 0000-0002-4010-2883

Pediatric Radiology


 Evrim Özmen, MD

Department of Radiology, Koç University Hospital, İstanbul, Türkiye

E-mail: evrimkilicdr@gmail.com

ORCID ID: 0000-0003-3100-4197

Editorial Consultant to Editor-in-Chief

 Mehmet Ruhi Onur, MD

Department of Radiology, Hacettepe University Faculty of Medicine, Ankara, Türkiye

E-mail: ruhionur@yahoo.com

ORCID ID: 0000-0003-1732-7862

Publication Coordinator

 Nermin Tunçbilek, MD

Department of Radiology, Trakya University Faculty of Medicine, Edirne, Türkiye

E-mail: drtuncbilek@hotmail.com

ORCID ID: 0000-0002-8734-1849

Biostatistical Consultant

 İlker Ercan, PhD

Department of Biostatistics, Uludağ University School of Medicine, Bursa, Türkiye

E-mail: iercan@msn.com

ORCID ID: 0000-0002-2382-290X

Social Media Leads

Tümay Bekçi, MD

Department of Radiology, Giresun University Faculty of Medicine, Giresun, Türkiye

Mahmut Bilal Doğan, MD

Department of Radiology, Marmara University Faculty of Medicine, İstanbul, Türkiye

Kendal Erincik, MD

Department of Radiology, İstanbul Medeniyet University Faculty of Medicine, İstanbul, Türkiye

Gürsel Karacaoğlu, MD

Department of Radiology, İstanbul Medeniyet University Faculty of Medicine, İstanbul, Türkiye

Publication Services

Galenos Publishing, İstanbul, Türkiye

Past Editors

Editors in Chief

Mehmet Ruhi Onur, MD (2023-2026)

Mustafa Seçil, MD (2016-2023)

Nevzat Karabulut, MD (2011-2016)

Üstün Aydingöz, MD (2010-2011)

Okan Akhan, MD (2001-2010)

Ferhun Balkancı, MD (1999-2001)

Aytekin Besim, MD (1994-1999)*

* Dr. Aytekin Besim actually served as the General Coordinator. His work in this capacity, however, was in effect that of an Editor in Chief.

Editors

Ayşenur Cila, MD (2001-2002)

Suat Kemal Aytaç, MD (1997-2001)

Erhan Ilgıt, MD (1994-2001)

Okan Akhan, MD (1994-2001)

Ferhun Balkancı, MD (1994-2000)

Serdar Akyar, MD (1994-1997)

Section Editors

Section Editorship was established in 2002 at the tenure of Dr. Okan Akhan, Editor in Chief.

Abdominal Imaging

Bengi Gürses, MD (2020-2023)

Mehmet Ruhi Onur, MD (2016-2023)

Barış Türkbey, MD (2014-2020)

Mustafa N. Özmen, MD (2012-2018)

Murat Acar, MD (2015-2016)

Mustafa Seçil, MD (2011-2016)

Ahmet Tuncay Turgut, MD (2011)

Deniz Akata, MD (2007-2011)

Ayşe Erden, MD (2002-2011)

Okan Akhan, MD (2002-2010)

Hakan Özdemir, MD (2002-2010)

Artificial Intelligence and Informatics

Burak Koçak, MD (2023-2026)

Barış Türkbey, MD (2020-2023)

Breast Imaging

Mustafa Erkin Arıbal, MD (2016-2023)

Sibel Kul, MD (2015-2018)

Ayşenur Oktay, MD (2009-2014)

Ayşegül Özdemir, MD (2004-2009)

Cardiovascular Imaging

Uğur Bozlar, MD (2016-2023)

Muşturay Karçaaltıncaba, MD (2007-2010)

Mecit Kantarcı, MD (2010-2016)

Chest Imaging

Nevzat Karabulut, MD (2010-2014)

Çetin Atasoy, MD (2007-2010)

Macit Arıyürek, MD (2002-2007)

Figen Demirkazık, MD (2014-2018)

General Radiology

Ersin Öztürk, MD (2014-2017)

Utku Şenol, MD (2010-2013)

Oğuz Dicle, MD (2007-2010)

Interventional Radiology

James Milburn, MD (2023-2026)

Cüneyt Aytekin, MD (2016-2023)

Bora Peynircioğlu, MD (2012-2015)

Levent Oğuzkurt, MD (2011-2014)

Fatih Boyvat, MD (2007-2010)

İsmail Oran, MD (2015-2019)

Musculoskeletal Imaging

Hatice Tuba Sanal, MD (2016-2023)

Fatih Kantarcı, MD (2014-2016)

Ayşenur Oktay, MD (2011-2013)

Üstün Aydingöz, MD (2002-2011)

Berna Dirim Mete (2016-2017)

Neuroradiology and Head & Neck Imaging

Gülgün Yılmaz Ovalı, MD (2023-2026)

Kubilay Aydın, MD (2016-2023)

Nafi Aygün, MD (2016-2023)

Kader Karlı Oğuz, MD (2011-2015)

Süleyman Men, MD (2007-2013)

Muhteşem Ağıldere, MD (2002-2011)

Nuclear Medicine

Evrin Bengi Türkbey, MD (2023-2026)

A. Cahid Civelek, MD (2016-2023)

Oktay Sarı, MD (2015)

Akın Yıldız, MD (2011-2014)

Pediatric Radiology

Meltem Ceyhan Bilgici, MD (2023-2026)

Korgün Koral, MD (2016-2023)

Murat Kocaoğlu, MD (2016-2023)

Ensar Yekeler, MD (2014-2016)

Suat Fitöz, MD (2007-2013)



Official Journal of the Turkish Society of Radiology

E-ISSN: 1305-3612

www.dirjournal.org

Diagnostic and Interventional Radiology (Diagn Interv Radiol) is a bimonthly periodical of the Turkish Society of Radiology and the content of the journal is available at <https://www.dirjournal.org/>. It is peer-reviewed and adheres to the highest ethical and editorial standards. The editors of the journal endorse the Editorial Policy Statements Approved by the Council of Science Editors Board of Directors (<https://cse.memberclicks.net/>). The journal is in compliance with the Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals published by the International Committee of Medical Journal Editors (updated May 2022, www.icmje.org).

First ten volumes of Diagnostic and Interventional Radiology have been published in Turkish under the name of Tanısal ve Girişimsel Radyoloji (MEDLINE abbreviation: Tani Girisim Radyol), the current title's exact Turkish translation.

Diagnostic and Interventional Radiology is an open access publication, and the journal's publication model is based on Budapest Open Access Initiative (BOAI) declaration. All published content is available online, free of charge at <https://www.dirjournal.org/>. Authors retain the copyright of their published work in Diagnostic and Interventional Radiology. The journal's content is licensed under a Creative Commons Attribution-NonCommercial (CC BY-NC) 4.0 International License which permits third parties to share and adapt the content for non-commercial purposes by giving the appropriate credit to the original work.

Please refer to the journal's webpage (<https://dirjournal.org/>) for "Aims and Scope", "Instructions to Authors" and "Instructions to Reviewers".

The editorial and publication processes of the journal are shaped in accordance with the guidelines of the ICMJE, WAME, CSE, COPE, EASE, and NISO.

Diagnostic and Interventional Radiology is indexed in **SCI-Expanded, Pubmed/Medline, Pubmed Central, TUBITAK ULAKBIM TR Index, Scopus, DOAJ, EBSCO, HINARI, EMBASE, CINAHL, ProQuest, Gale and CNKI.**

The journal is published online.

Owner: Turkish Society of Radiology

Responsible Manager: Şükrü Mehmet Ertürk

Contact Information

Diagnostic and Interventional Radiology Turkish Society of Radiology

Hoşdere Cad., Güzelkent Sok., Çankaya Evleri, F/2, 06540
Ankara, Türkiye

E-mail: info@dirjournal.org

Phone: +90 (312) 442 36 53 **Fax:** +90 (312) 442 36 54

Publisher Contact

Address: Molla Gürani Mah. Kaçamak Sk.

No: 21/1 34093 İstanbul, Türkiye

Phone: +90 (530) 177 30 97

E-mail: info@galenos.com.tr/yayin@galenos.com.tr

Web: www.galenos.com.tr **Publisher Certificate Number:** 14521

Online Publication Date: July 2026

EISSN 1305-3612

International scientific journal published bimonthly.



TURKISH SOCIETY OF RADIOLOGY

Turkish Society of Radiology is one of the foremost medical specialty organizations in Türkiye. It was formed by the merger of the two main radiology societies of Türkiye, one of which was founded in 1924. The Society is based in Ankara, Türkiye.

Contents

EDITORIAL

351 The final biological component: AI and radiology's mechanistic drift. Şükrü Mehmet Ertürk

ABDOMINAL IMAGING

354 Original Article Multi-organ non-contrast computed tomography radiomics model to predict hepatic encephalopathy in patients with cirrhosis and hepatorenal failure. Jin-ming Cao, Ming-ya Zhang, Xue-mei Ding, Hai-ying Zhou, Xiao-ming Zhang, Tian-wu Chen

363 Letter to the Editor Hepatic alveolar echinococcosis: a great tumor mimicker. Diğdem Kuru Öz, Ayşe Erden

ARTIFICIAL INTELLIGENCE AND INFORMATICS

365 Original Article Comparative analysis of tumor and mesorectum radiomics in predicting neoadjuvant chemoradiotherapy response in locally advanced rectal cancer. Ali Cantürk, Raif Can Yarol, Ali Samet Tasak, Hakan Gülmez, Kenan Kadırlı, Tayfun Bişgin, Berke Manoğlu, Selman Sökmen, İlhan Öztop, İlknur Görken Bilkay, Özgül Sağol, Sülen Sarıoğlu, Funda Barlık

376 Original Article Comparison of the diagnostic performance of the artificial intelligence-based TIRADS algorithm with established classification systems for thyroid nodules. Abdilkadir Bozkuş, Yeliz Başar, Koray Güven

382 Original Article Automated detection and characterization of small cell lung cancer liver metastasis on computed tomography. Sophia Ty, Fahmida Haque, Parth Desai, Nobuyuki Takahashi, Usamah Chaudhary, Peter L. Choyke, Anish Thomas, Barış Türkbey, Stephanie A. Harmon

391 Commentary Turkish Society of Radiology artificial intelligence applications guide: a roadmap to help navigate the artificial intelligence landscape. Oğuz Dicle, Firat Atak, Abdullah Utku Şenol, Mustafa Nasuh Özmen, Nur Hürsoy, Naciye Sinem Gezer, Üstün Aydıngöz

393 Letter to the Editor Reply: Comment on the diagnostic sensitivity of ChatGPT for detecting hemorrhages in cranial computed tomography scans. Olga Bayar Kapıcı, Erman Altunışık, Feyza Musabeyoğlu, Şeyda Dev, Ömer Kaya

395 Letter to the Editor Letter to the Editor: Rethinking reference accuracy in large language models for radiology. Hamza Eren Güzel

397 Letter to the Editor Reply: Evaluating the reference accuracy of large language models in radiology: a comparative study across subspecialties. Yasin Celal Güneş, Turay Cesur, Eren Çamur

BREAST IMAGING

399 Original Article Comparative analysis of the diagnostic value of dynamic contrast-enhanced magnetic resonance imaging kinetic heterogeneity and apparent diffusion coefficient for grading invasive breast cancer. Xinyu Feng, Peiwei Ye, Hui Chen, Changyu Liu, Qingqiang Zhu

CARDIOVASCULAR IMAGING

409 Invited Review Computed tomography and magnetic resonance imaging findings in congenital cardiovascular anomalies. Mustafa Koplay, Nusret Seher

426 Pictorial Essay The imaging spectrum of myocardial infarction and its associated complications: a contemporary pictorial review of computed tomography and magnetic resonance imaging. Yu Zhang, Sung Min Ko

CHEST IMAGING

437 Invited Review Photon-counting detector computed tomography in thoracic oncology: revolutionizing tumor imaging through precision and detail. Masahiro Yanagawa, Midori Ueno, Rintaro Ito, Daiju Ueda, Tsukasa Saida, Ryo Kurokawa, Koji Takumi, Kentaro Nishioka, Shunsuke Sugawara, Satoru Ide, Maya Honda, Mami Iima, Mariko Kawamura, Akihiko Sakata, Keitaro Sofue, Seitaro Oda, Tadashi Watabe, Kenji Hirata, Shinji Naganawa

448 Original Article Diagnostic value of portable handheld digital radiography in a beagle model of thoracic trauma. Gaofeng Liu, Xueqi Fang, Sujuan Cui, Li Zhou, Yong Zhang, Qingyuan Li, Xingjian Fang, Yutao Yan

GENERAL RADIOLOGY

453 Letter to the Editor Letter to the editor: Beyond publication rates: improving the quality and impact of radiology residency research. Hakan Ayyıldız, Şükrü Mehmet Ertürk

455 Letter to the Editor Reply: Beyond publication rates: improving the quality and impact of radiology residency research. Ali Salbas, Ali Murat Koc

Contents

HEAD AND NECK IMAGING

457 Original Article T2 signal ratio enhances the diagnostic performance of apparent diffusion coefficient in differentiating orbital lymphoma from inflammatory mimickers. *Elif Günay Bulut, Ekim Gümeler, Jale Karakaya, Levent Kılıç, Ömer Karadağ, Kader Karlı Oğuz*

INTERVENTIONAL RADIOLOGY

463 Original Article Association between magnetic resonance imaging-based prostatic tissue morphology and changes in International Prostate Symptom Score and maximum urinary flow rate after prostatic artery embolization. *Chen Wang, Kun Liang, Jiasheng Qin, Xin Shu, Lihua Yuan, Jianfei Dong*

473 Original Article The safety and efficacy of the percutaneous balloon-expandable biodegradable magnesium biliary stents in patients with liver transplant. *Ramazan Kutlu, Nurullah Dağ, Eldiir Saparbekov*

479 Original Article Impact of biopsy route, muscle pathway, and cortex target on safety and diagnostic yield in ultrasound-guided renal parenchymal biopsy. *Kadir Han Alver, Halil Serdar Aslan, Muhammet Arslan, Muhammed Tekinhatun, Mahmut Demirci, Nagihan Yalçın, Ahmet Baki Yağcı*

487 Original Article Minimizing radiation exposure in children: the role of spot region of interest imaging in venous access procedures. *Özhan Özgür, Cemil Oktay, Demet Gündüz, Erhan Heperenler, Hakkı Timur Sindel*

MUSCULOSKELETAL IMAGING

492 Original Article Association of patellofemoral malalignment with early trochlear and patellar chondromalacia: a prospective T2* mapping study. *Uğurcan Süner, Atilla Hikmet Çilengir, Tuğrul Bulut, Merve Gürsoy, Yılmaz Önder, Berna Dirim Mete*

500 Original Article Magnetic resonance imaging-based morphologic features associated with ankle sprain and increased risk of ligament tear. *Hande Özen Atalay, Gizem Timoçin Yiğman, Erol Erinç Dokuyucu, Evrim Özmen*

NEURORADIOLOGY

510 Original Article Prognostic value of nidus sphericity in brain AVMs treated with Gamma Knife Radiosurgery: a preliminary study. *Yunus Emre Şentürk, Enes Muhammed Cantürk, Ahmet Peker, Sabahattin Yüzkan, Selçuk Peker*

519 Letter to the Editor Letter to the Editor: Comment on the diagnostic sensitivity of ChatGPT for detecting hemorrhages in cranial computed tomography scans. *Yiğit Can Kartal*