



www.TurkJBiochem.com

TÜRK BİYOKİMYA DERGİSİ

Turkish Journal of Biochemistry

XXXI. TÜRK
BİYOKİMYA
DERNEĞİ ULUSAL
BİYOKİMYA
KONGRESİ 2020 XXXI. NATIONAL
CONGRESS OF
THE TURKISH
BIOCHEMICAL
SOCIETY 2020

18-20 Aralık 2020,
Sanal Kongre, Türkiye

18-20 December 2020,
Virtual Congress, Turkey

YER ALDIĞI
İNDEKSLER
[INDEXED BY]

Türk Biyokimya Derneği'nin yayın organıdır.
[Published by the Turkish Biochemical Society]

2020

Cilt [Volume] 45

Ek Sayı [Supplement] 2 (DEC 2020)

SCI Expanded,
Journal Citation
Reports/Science
Edition, Chemical
Abstracts, Index
Copernicus,
Embase, Scopus,
Ulakbim Türk
Tıp Dizini,
Ulrich's Periodical
Directory, EBSCO,
Türkiye Atıf Dizini



2020 . VOLUME 45 . SUPPLEMENT ISSUE 2 (DEC 2020)

TURKISH JOURNAL OF BIOCHEMISTRY TÜRK BİYOKİMYA DERGİSİ

OFFICIAL JOURNAL OF THE TURKISH BIOCHEMICAL SOCIETY

EDITOR IN CHIEF

[BAŞ EDİTÖR]

Doğan Yücel, Ankara, TR

VICE EDITORS

[YARDIMCI EDİTÖRLER]

Aylin Sepici Dinçel, Ankara, TR
Merve Sibel Güngören, Ankara, TR
Oytun Portakal, Ankara, TR
Muhittin Serdar, Ankara, TR
Mehmet Şeneş, Ankara, TR

SUPPLEMENT EDITOR

[EK SAYI EDİTÖRÜ]

Ferhan Girgin Sağıن, İzmir, TR

ASSOCIATE EDITORS

[BÖLÜM EDİTÖRLERİ]

Sedat Abuoğlu, Konya, TR
Ebubekir Bakan, Erzurum, TR
Sreeparna Banerjee, Ankara, TR
Emine Bayraktar, Ankara, TR
Ebru Bodur, Ankara, TR
Murat Bolayırı, İstanbul, TR
Abdurrahman Coşkun, İstanbul, TR

Özlem Dalmızrak, Nicosia, TRNC
Birsen Can Demirdögen, Ankara, TR
Suat Erdoğan, Edirne, TR
Uzay Görmüş, Solna, SE
Levent Kayrın, Kyrenia , TRNC
Semra Koçtürk, İzmir, TR
İşil Aksun Kurnaz, Kocaeli, TR
Melek Özkan, Kocaeli, TR
Yeşim Özkan, Ankara, TR
Ebru Saatçi, Kayseri, TR
Çağdaş Son, Ankara, TR
Alaattin Şen, Denizli, TR
Ajlan Tükün, Ankara,TR
Hamdi Uysal, Ankara, TR
Serenay Elgün Ülkar, Ankara, TR
Süha Yalçın, İstanbul, TR
İlhan Yaylim, İstanbul, TR
Fatma Meriç Yılmaz, Ankara, TR
Meral Yüksel, İstanbul, TR

STATISTICS EDITORS

[İSTATİSTİK EDİTÖRLERİ]

Erdal Coşgun, Redmond, WA, USA
Sevilay Karahan, Ankara, TR
Jale Karakaya, Ankara, TR

TECHNICAL EDITORS

[TEKNİK EDİTÖRLER]

Tülin Bayrak, Ordu, TR
Birsen Can Demirdögen, Ankara, TR
Merve Sibel Güngören, Ankara, TR
Elvan Laleli Şahin, Dallas, USA
Duygu Şahin, İstanbul, TR
Z. Onur Uygun, İzmir, TR
Oğuzhan Zengi, İstanbul, TR

CORRESPONDENCE

[YAZI İŞLERİ]

Nermin Şahan, Ankara, TR

**EDITORIAL BOARD****[EDİTÖRLER KURULU]**

Khosrow Adeli, Molecular Medicine, Research Institute, The Hospital for Sick Children, University of Toronto, Toronto, Ontario, CANADA
Diler Aslan, Department of Biochemistry, Faculty of Medicine, Pamukkale University, Denizli, TURKEY
Cumhur Bilgi, Department of Medical Biochemistry, University of Yüksek İhtisas, Ankara, TURKEY
Anyla Bulo-Kasneci, Laboratory Department, University Hospital Center "Mother Teresa", Tirana, ALBANIA
Orhan Değer, Department of Medical Biochemistry, Faculty of Medicine, Karadeniz Technical University, Trabzon, TURKEY
Elif Demirkan, Department of Biology, Faculty of Arts & Sciences, Uludağ University, Bursa, TURKEY
Z. Günür Dikmen, Department of Biochemistry, Faculty of Medicine, Hacettepe University, Ankara, TURKEY
Miral Dizdaroglu, National Institute of Standards and Technology, Gaithersburg, MD, USA
Mustafa B. A. Djamgoz, Department of Life Sciences, Faculty of Natural Sciences, Imperial College, London, UNITED KINGDOM
Figen Erkoç, Department of Biology Education, Faculty of Gazi Education, Gazi University, Ankara, TURKEY
Gökhan Hotamışlıgil, Department of Genetics and Complex Diseases, Harvard School of Public Health, Boston, USA
Mehmet Kesimer, Department of Pathology and Laboratory Medicine, Marsico Lung Institute, University of North Carolina at Chapel Hill, NC, USA
İrfan Küfrevoioğlu, Department of Chemistry, Faculty of Art & Sciences, Ataturk University, Erzurum, TURKEY
Nada Majkic-Singh, Institute of Medical Biochemistry, Pharmaceutical Faculty and Clinical Centre of Serbia, Belgrade, SERBIA
Gülgün Oktay, Department of Medical Biochemistry, Faculty of Medicine, University of Dokuz Eylül, İzmir, TR
İ. Hamdi Öğüş, Department of Medical Biochemistry, Faculty of Medicine, Near East University, Nicosia, TRNC

Yeşim Özarda, Department of Medical Biochemistry, Faculty of Medicine, Uludağ University, Bursa, TURKEY
Tomris Özben, Department of Medical Biochemistry, Faculty of Medicine, Akdeniz University, Antalya, TURKEY
Nazmi Özer, Department of Medical Biochemistry, Faculty of Medicine, Near East University, Nicosia, TRNC
İsrael Pecht, Department of Immunology, Weizmann Institute of Science, Rehovot, ISRAEL
Mario Plebani, Department of Medical Sciences, University of Padova, Padova, ITALY
Demetrios Rizos, Hormonal and Biochemical Laboratory, Aretaeio Hospital, University of Athens, Athens, GREECE
George Russev, Bulgarian Academy of Sciences, Institute of Molecular Biology, Sofia, BULGARIA
Fahri Saatçioğlu, Department of Biosciences, University of Oslo, Oslo, NORWAY
Ferhan Girgin Sağm, Department of Medical Biochemistry, Faculty of Medicine, Ege University, İzmir, TURKEY
Aziz Sancar, Department of Biochemistry and Biophysics, University of North Carolina School of Medicine, Chapel Hill, NC, USA
Praveen Sharma, All India Institute of Medical Sciences, Jodhpur, INDIA
Emin Sofic, Department of Chemistry, Faculty of Science, Sarajevo University, Sarajevo, BOSNIA AND HERZEGOVIA
Eser Sözmen, Department of Medical Biochemistry, Faculty of Medicine, University of Ege, İzmir, TR
Abdullah Tuli, Department of Medical Biochemistry, Faculty of Medicine, Çukurova University, Adana, TURKEY
Ali Ünlü, Department of Biochemistry, Faculty of Medicine, Selçuk University, Konya, TURKEY
Sedef Yenice, Department of Clinical Chemistry, Group Florence Nightingale Hospitals, İstanbul, TURKEY

Turkish Journal of Biochemistry (TJB), official journal of Turkish Biochemical Society, is issued electronically every 2 months. Research articles, reviews, short communications, technical reports, case presentations, opinions, and letters to the editor, that have not published elsewhere, on biochemistry, clinical biochemistry, molecular biology, molecular genetics, biotechnology, bioinformatics, bioengineering, and their educational disciplines are published in the journal.

The main aim of the journal is to support the research and publishing culture by ensuring that every published manuscript has an added value and thus providing international acceptance of the "readability" of the manuscripts published in the journal.

e-ISSN 1303-829X

All information regarding notes for contributors, subscriptions, Open access, back volumes and orders is available online at www.degruyter.com/view/j/tjb.

RESPONSIBLE EDITOR Doğan Yücel PhD, Assoc Professor of Biochemistry, Department of Medical Biochemistry, Ankara Training and Research Hospital, University of Health Sciences, 06340, Ankara, Turkey, Tel: +90312 595 321, Email: doyucel@yahoo.com

JOURNAL MANAGER Alexander Görsl, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany. Tel.: +49 (0) 30 260 05–234, Fax: +49 (0) 30 260 05–250, Email: alexander.goerlt@degruyter.com

RESPONSIBLE FOR ADVERTISEMENTS Claudia Neumann, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany. Tel.: +49 (0) 30 260 05–226, Fax: +49 (0) 30 260 05–264, Email: anzeigen@degruyter.com

TYPESETTING Compuscript Limited, Shannon, Ireland

© 2019 Walter de Gruyter GmbH, Berlin/Boston