



The Society of Pharmaceutical Sciences of Ankara (FABAD)
FABAD Journal of Pharmaceutical Sciences
Volume: 50 Issue: 3 October 2025

Publisher

Sevgi AKAYDIN (Gazi University, Department of Biochemistry, Ankara, Turkey)

Editor in Chief

Nesrin Gökhan KELEKÇİ (Hacettepe University, Department of Pharmaceutical Chemistry, Ankara, Turkey)

Co-Editors

Selen ALP (Ankara University, Department of Pharmaceutical Chemistry, Ankara, Turkey)
Selin Seda TİMUR (Hacettepe University, Department of Pharmaceutical Technology, Ankara, Turkey)
Aylin ELKAMA (Gazi University, Department of Pharmaceutical Toxicology, Ankara, Turkey)

Technical Editors

Gökçen TELLİ (Hacettepe University, Department of Pharmacology, Ankara, Turkey)
Vahap Murat KUTLUAY (Hacettepe University, Department of Pharmacognosy, Ankara, Turkey)

Biostatistics Editor

Hatice Yağmur ZENGİN Hacettepe University, Faculty of Medicine, Department of Biostatistics, Ankara, Turkey

Editorial Board

Almira RAMANAŲIČIENĖ Vilnius University, Nanotechnology and Material Sciences Center, Vilnius, Latvia
Alper GÖKBULUT Ankara University, Department of Pharmacognosy, Ankara, Turkey
Ashok K. SHAKYA Al Ahliyya Amman University, Department of Pharmaceutical Chemistry, Amman, Jordan
Aygin EKİNCİOĞLU Hacettepe University, Department of Clinical Pharmacy, Ankara, Turkey
Ayşe KURUÖZÜM UZ Hacettepe University, Department of Pharmacognosy, Ankara, Turkey
Bharat JHNAWAR Lovely Professional University, Pharmaceutical Sciences, Punjab, India
Bülent KIRAN Ege University, Department of Pharmacy Management, İzmir, Turkey
Ceyda Tuba ŞENGEL TÜRK Ankara University, Department of Pharmaceutical Technology, Ankara, Turkey
Chia-Yi TSENG Chung Yuan Christian University, Biomedical Engineering, Taoyuan, Taiwan
Didem DELİORMAN ORHAN Gazi University, Department of Pharmacognosy, Ankara, Turkey
Emel Öykü ÇETİN UYANIKGİL Ege University, Department of Pharmaceutical Technology, İzmir, Turkey
Filiz BAKAR ATEŞ Ankara University, Department of Biochemistry, Ankara, Turkey
Francesco EPIFANÒ G. D'Annunzio University, Department of Pharmaceutical Chemistry, Chieti-Pescara, Italy
Gerard LIZARD University of Burgundy, French Institute for Medical and Health Research, Dijon, France
Gökçe CİHAN ÜSTÜNDAĞ Istanbul University, Department of Pharmaceutical Chemistry, Ankara, Turkey
Gökçen EREN Gazi University, Department of Pharmaceutical Chemistry, Ankara, Turkey
Hande GÜRER ORHAN Ege University, Department of Pharmaceutical Toxicology, İzmir, Turkey
Hasan Abougazar YUSUFOĞLU King Saud University, Department of Pharmacognosy, Riyadh, Saudi Arabia
Hasan KIRMIZİBEKMEZ Yeditepe University, Department of Pharmacognosy, Istanbul, Turkey
İkhlas KHAN University of Mississippi, National Center for Natural Product Research, USA.
İşıl ÖZAKCA GÜNDÜZ Ankara University, Department of Pharmacology, Ankara, Turkey
İnci Selin DOĞAN Karadeniz Technical University, Department of Pharmaceutical Chemistry, Trabzon, Turkey
Leyla YURTTAŞ Anadolu University, Department of Pharmaceutical Chemistry, Eskişehir, Turkey
Melike H. ÖZKAN Hacettepe University, Department of Pharmacology, Ankara, Turkey
Meltem ÜNLÜSOY Ankara University, Department of Pharmaceutical Chemistry, Ankara, Turkey
Merve BACANLI University of Health Sciences, Department of Pharmaceutical Toxicology, Ankara, Turkey
Merve BECİT Afyonkarahisar University of Health Sciences, Department of Pharmaceutical Toxicology, Afyonkarahisar, Turkey
Mesut SANCAR Marmara University, Department of Clinical Pharmacy, Istanbul, Turkey
Ming-Wei CHAO Chung Yuan Christian University, Department of Bioscience Technology, Taoyuan, Taiwan
Muharrem ÖLÇER Afyonkarahisar University of Health Sciences, Department of Pharmaceutical Technology, Afyonkarahisar, Turkey
Natalizia MICELI University of Messina, Department of Chemistry and Biology, Messina, Italy
Özlem Nazan ERDOĞAN Istanbul University, Department of Pharmacy Management, Ankara, Turkey
Sevda ŞENEL Hacettepe University, Department of Pharmaceutical Technology, Ankara, Turkey
Sevtap AYDIN DİLSİZ Hacettepe University, Department of Pharmaceutical Toxicology, Ankara, Turkey
Suryakanta SWAIN The Assam Kaziranga University, Department of Pharmaceutical Sciences, Assam, India
Şükrü BEYDEMİR Anadolu University, Department of Pharmaceutical Microbiology, Ankara, Turkey
Tuba İNCEÇAYIR Gazi University, Department of Pharmaceutical Technology, Ankara, Turkey
Tuğba TÜYLÜ KÜÇÜKKİLİNC Hacettepe University, Department of Biochemistry, Ankara, Turkey
Tuğçe YEŞİL Marmara University, Department of Pharmaceutical Toxicology, Istanbul, Turkey
Uğur TAMER Gazi University, Department of Analytical Chemistry, Eskişehir, Turkey
Vu Dang HOANG Hanoi University of Pharmacy, Department of Analytical Chemistry and Toxicology, Hanoi, Vietnam
Wolfgang SCHUHLY University of Graz Institute of Pharmaceutical Sciences, Department of Pharmacognosy, Graz, Austria

The FABAD Journal of Pharmaceutical Sciences is published three times a year by the
Society of Pharmaceutical Sciences of Ankara (FABAD)

All expressions of opinion and statements of supposed facts appearing in articles and / or advertisements carried in this journal are published on the responsibility of the author and / or advertiser, and are not to be regarded those of the Society of Pharmaceutical Sciences of Ankara. The manuscript submitted to the Journal has the requirement of not being published previously and has not been submitted elsewhere. Manuscript should be prepared in accordance with the requirements specified as in the back cover. The submission of the manuscript to the Journal is not a condition for acceptance; articles are accepted or rejected on merit alone. This Journal is published electronically and it is an open-access journal without publication fee. All rights reserved. Neither this work nor any part may be reproduced or transmitted in any form or by any means, electronic or mechanical, microfilming and recording, or by any information storage and retrieval systems without written permission from FABAD Journal of Pharmaceutical Sciences.

The FABAD Journal of Pharmaceutical Sciences is indexed in Chemical Abstracts, Analytical Abstracts, International Pharmaceutical Abstracts, Excerpta Medica (EMBASE), Scopus and TR Index