PHARMACEUTICAL NANOTECHNOLOGY

Editorial Board

Editor-in-Chief

Zongjin Li
Department of Pathophysiology
Nankai University School of Medicine
Tianjin
(China)

Biography

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Biography of Zongjin Li

Dr. Zongjin Li is a Professor at the Department of Pathophysiology and a Director of the Laboratory of Molecular Imaging and Stem Cell Therapy at Nankai University School of Medicine, Tianjin, China. He received his PhD degree from Peking Union Medical College and completed his postdoctoral training in the Molecular Imaging Program (MIPS) at Stanford University, USA. He has published more than 120 peer-reviewed papers on molecular imaging and stem cell therapy.

Close

Co-Editors

Jay B. Ramapuram
Department of Drug Discovery and Development

Harrison School of Pharmacy
Auburn, AL
(USA)
Biography
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Biography of Jay B. Ramapuram

Dr. Ramapuram Jayachandra Babu is currently a Professor and Graduate Program Officer at the Department of Drug Discovery and Development, Harrison School of Pharmacy, Auburn University. He received his Bachelor's degree in Pharmacy from the University of Madras and Masters and PhD degrees in Pharmaceutics from Indian Institute of Technology, Varanasi, India. His research interests include formulation development of nanoparticle based formulations for topical and oral delivery, solubility improvement of insoluble drugs, percutaneous penetration enhancement techniques, and transdermal drug delivery systems. He has authored and co-authored over 90 peer reviewed papers and 100 conference abstracts in several national and international conferences. He has served as a chair and co-chair of scientific sessions at the Annual National Meetings of American Association of Pharmaceutical Scientists and Society of Toxicology. He serves as an editorial board member for five journals and as a peer reviewer for more than forty journals. His field of expertise are Transdermal Drug Delivery; Nanoparticles, Solubility improvement; Ocular Drug Delivery.

Close

Associate Editors

Maria J. Blanco-Prieto
Department of Pharmacy and Pharmaceutical Technology
University of Navarra
Pamplona
(Spain)
Biography
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Biography of Maria J. Blanco-Prieto

Maria J. Blanco-Prieto received her degree of Pharmacy Degree from the University of Santiago de Compostela (Spain), followed by a PhD in Pharmaceutical Sciences from the University of Paris-Sud (France). She completed post-doctoral training at the Swiss Federal Institute of Technology (ETH), Zürich, (Switzerland) and then joined the University of Navarra where presently she is a Full Professor of Pharmacy and Pharmaceutical Technology. Her research interest is in the field of biomaterials and advanced drug carrier systems including the design and the development of

polymer and lipid based micro- and nanoscale carriers, their biological evaluation in in vitro cell cultures and also their pharmacokinetic and dynamic impact in vivo (using relevant animal models of the diseases).

Close

Darryl T. Martin
Department of Urology
Yale University School of Medicine
New Haven, CT
(USA)

Biography

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Biography of Darryl T. Martin

Dr. Darryl T. Martin is a Research Scientist at the Yale School of Medicine. He obtained his PhD from the Division of Biomedical Sciences, the Memorial University of Newfoundland in 2010. His research interests include drug delivery systems that target prostate and bladder cancers using nanoparticle-based platforms for diagnostic and therapeutic purposes.

Close

Yu Nie
Department of Biomedical Engineering
Sichuan University (SCU)
Chengdu
(China)

Biography

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Biography of Yu Nie

Dr. Yu Nie obtained PhD in Pharmaceutical Sciences from West China School of Pharmacy, Sichuan University, China. She is presently serving as a Professor at NERCB, Sichuan University, China and before that she was an Assistant Professor at the same institution. She also has an experience as a postdoc fellow at Ludwig-Maximilian-University of Munich, Germany. Her research interests include Regenerated bio-materials, medicinal excipients in ophthalmology and Orthopedics. She has contributed more than 50 publications, having citations around 1050.

Close

Regional Editors

Asia

Farid Dorkoosh
Department of Pharmaceutics
Tehran University of Medical Sciences
Tehran
(Iran)
Biography
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Biography of Farid Dorkoosh

Dr. Dorkoosh received his PhD in pharmaceutics and biopharmaceutics from Leiden University, the Netherlands in 2002. He followed an international training on intellectual property and management of innovation at World Intellectual Property Organization (WIPO) in Geneva, Switzerland in 2005. He got his Diploma in management from Chartered Management Institute of London, UK in 2009. He is currently an associate professor at Tehran University of Medical Sciences. He is also the head of Patent office of Tehran University of Medical Sciences. Dr. Dorkoosh has published more than 80 research articles and held 10 patents and patent applications.

Close

Murugan Ramalingam
Centre for Stem Cell Research
Christian Medical College Campus
Vellore
(India)
Biography
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Biography of Murugan Ramalingam

Dr. Murugan Ramalingam is a Professor at the Centre for Stem Cell Research (India). Concurrently, he is an Adjunct Professor at the Tohoku University (Japan). He worked as Associate Professor at the Université de Strasbourg (France) and Assistant Professor at the WPI-Advanced Institute for Materials Research (Japan). He has also worked at the U.S. National Institute of Standards and Technology (NIST) and the National Institutes of Health (NIH). He received his Ph.D. in Biomaterials from the University of Madras. He is the author of over 260 scientific publications.

Close

Europe

Clare Hoskins
Director of Postgraduate Research Medical Sciences (Laboratory)
Keele University
Newcastle, England
(United Kingdom)
Biography
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Biography of Clare Hoskins

Dr. Clare Hoskins obtained PhD in Pharmaceutics from Robert Gordon University, Aberdeen. She is presently serving as a Senior Lecturer in Pharmaceutics at Keele University. She is a member of different professional bodies such as Royal Society of Chemistry, Controlled Released Society, British Nano-medicine Society and Higher Education Academy. She has contributed numerous publications in different national and international journals. She also possesses different editorial responsibilities in different journals as a guest editor and editorial board member.

Close

North America

Glen S. Kwon
School of Pharmacy-Wisconsin Center for NanoBioSystems
University of Wisconsin
Madison, WI
(USA)
Biography
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Biography of Glen S. Kwon

Dr. Kwon is the Jens T. Carstensen Distinguished Chair Professor in the School of Pharmacy at University of Wisconsin. He received the Jorge Heller Journal of Controlled Release/Controlled Release Society (CRS) Outstanding Paper Award (1994) and CRS Young Investigator Research Achievement Award (2003). He is a Fellow

of the American Association of Pharmaceutical Scientists (2012) and a highly-cited researcher by Thomson Reuters in the category of Pharmacology & Toxicology (2014). He is co-founder of Co-D Therapeutics Inc., a start-up company dedicated to multi-drug anticancer nanotherapeutics.

Close

Section Editors

Section: Biodegradable polymers for nanomedicine

Rohidas Arote
Department of Molecular Genetics
Seoul National University
Seoul
(South Korea)

Biography

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Biography of Rohidas Arote

Prof. Arote Rohidas is an Associate Professor and the director of Nanomedicine Laboratory in the Dept. of Molecular Genetics, School of Dentistry, Seoul National University. His research includes nanotechnology, drug delivery, molecular targeting, nucleic acid delivery, bioimaging and modulation of cell death mechanism has been published in over 50 international journals and also produced various patents.

Close

Editorial Board Members

Hua Ai
Department of Radiology
Sichuan University
Chengdu
(China)

Alaa A. Aljabali
Faculty of Pharmacy
Yarmouk University
Irbid
(Jordan)
Biography
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Biography of Alaa A. Aljabali

Alaa A. Aljabali completed MRes in cancer biomarkers from Essex University and a Ph.D. in Bionanotechnology from John Innes Centre (UK). He worked as a postdoctoral research fellow at the University of Oxford on the development of nanoparticles as clinical imaging agents. Recently, he completed Fellowship in Responsible Conduct of Research at the University of California San Diego. His research interest are Biomaterials, Drug delivery and targeting, Material science, and Nanomedicine.

Close

Christine Allen
Leslie Dan Faculty of Pharmacy
University of Toronto
Toronto, ON
(Canada)
Biography
×

Biography of Christine Allen

Christine Allen is the GlaxoSmithKline Chair in Pharmaceutics and Drug Delivery and a Professor in the Leslie Dan Faculty of Pharmacy and the Departments of Chemical Engineering and Applied Chemistry and IBBME at the University of Toronto. Allen's research is focused on the design and development of new materials and technologies for the delivery of drugs and contrast agents. Her research has resulted in well over 100 peer-reviewed publications, numerous patent applications and book chapters on both lipid and polymer-based drug delivery systems. She is also the co-founder and President of Nanovista Inc., a start-up housed in Johnson & Johnson Innovations JLabs @Toronto, which is focused on the development of multimodal contrast agents to improve the performance of image-guided high precision cancer therapy.

Close

Stephanie Allen
School of Pharmacy
University of Nottingham

Nottingham
(UK)

Giulio Caracciolo
Department of Molecular Medicine
University of Rome
Rome
(Italy)
Biography
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Biography of Giulio Caracciolo

Giulio Caracciolo is Professor at the Molecular Medicine Department of the Sapienza University of Rome. He is mainly interested in understanding the bio–nano interactions between nanodelivery systems and physiological environments. The relationships between synthetic identity, biological identity and physiological response of drug delivery systems will enable researchers to predict their outcome after administration in vivo. This would represent a truly new paradigm in the field of pharmaceutics and nanomedicine.

Close

Bin Chen
State Key Laboratory of Multiphase Flow in Power Engineering
Xi'an Jiaotong University
Xi'an Shi
(China)
Biography
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Biography of Bin Chen

Dr. Bin Chen is now a Full Professor and Vice Director at the State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University. He received his Ph.D in 2002 from Xi'an Jiaotong University, China. Afterwards, he worked as Postdoctoral Research Fellow of Japan Society for the Promotion of Science from 2002 to 2004. For more than a decade, Dr. Chen has devoted his efforts to the research on laser dermatology, in particular with the laser treatment of Port Wine Stain. He is currently working on photothermal-activatable liposomal drug delivery, blood absorption enhancement by nano-particle, as well as animal experiment on thermal damage of blood capillary by 595nm and 1064nm laser. He has published over 50 peer-reviewed journal papers and was invited for more than 20 keynote speeches.

Close

Pieter Cullis
Biochemistry and Molecular Biology
University of British Columbia
Vancouver, BC
(Canada)
Biography
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Biography of Pieter Cullis

Pieter R. Cullis, Ph.D. FRSC is the Director of Life Sciences Institute at the University of British Columbia (UBC) He is a Professor in the Department of Biochemistry and Molecular Biology and Director of the, NanoMedicines Research Group, UBC. Dr. Cullis and co-workers made fundamental advances in the generation, loading and targeting of lipid nanoparticle (LNP) systems for intravenous delivery of small molecule drugs and macromolecular drugs such as small interfering RNA (siRNA). This work has contributed to three drugs that have been approved by regulatory agencies in the U.S. and Europe for the treatment of cancer and its complications. Dr. Cullis has co-founded ten biotechnology companies, has published over 300 scientific articles and is an inventor of over 60 patents. He also co-founded the BC Personalized Medicine Initiative in 2012. Dr. Cullis received many awards and was elected as the Fellow of the Royal Society of Canada in 2004 and was awarded the Prix Galien, Canada's premier prize for achievements in pharmaceutical R&D, in 2011.

Close

Sudip Das
Department of Pharmaceutics & Drug Delivery
Butler University, College of Pharmacy and Health Sciences
Indianapolis, IN
(USA)
Biography
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Biography of Sudip Das

Dr. Sudip Das is a professor of pharmaceutical sciences at Butler University, College of Pharmacy & Health Sciences. He is also an Adjunct Professor in the School of Medicine, Indiana University. He was the chair of the department of pharmaceutical sciences and the director of the graduate program in pharmaceutical sciences at Butler University. Dr. Das has over thirty years of teaching and research experience in the professional pharmacy and graduate programs in the USA and Canada. His current research involves targeted delivery of siRNA and anticancer drugs for the treatment of breast cancer and glioblastoma. Dr. Das has over 150 research publications, review articles, patents, proceedings, conference presentations, and book chapters, is a recipient of multiple awards/honors, and has secured

extramural research funding from NIH, PDA, and several pharmaceutical industries.

Close

Nunzio Denora
Department of Pharmacy
University of Bari Aldo Moro
Bari
(Italy)

Biography

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Biography of Nunzio Denora

Nunzio Denora received the degree in Chemistry and Pharmaceutical Technology from the University of Bari in 2001 and obtained his Ph.D. in Pharmaceutical Technology from the University of Palermo in 2004. After a postdoctoral position in the Department of Pharmaceutical Chemistry at Kansas University (2005-2006), he was appointed as assistant professor and research scientist of Pharmaceutical Technology in the Department of Pharmacy - Drug Sciences of the University of Bari. He has published more than 80 articles, is author of 3 book chapters, more than100 posters and several oral presentations and is inventor of 3 patents.

Close

Christine Dufès
Strathclyde Institute of Pharmacy and Biomedical Sciences
University of Strathclyde
Glasgow
(UK)

Biography

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Biography of Christine Dufès

Dr. Christine Dufès is a Senior Lecturer at the Strathclyde Institute of Pharmacy and Biomedical Sciences (SIPBS), University of Strathclyde, Glasgow, United Kingdom. She obtained a Doctorate in Pharmacy and a PhD from the University of Poitiers (France). Her research interests include the targeted delivery of drugs and therapeutic genes to tumours and cerebral diseases. She has been awarded the Biochemical Journal Young Investigator Award (2009) and the Tom Gibson Memorial Award (2012) for her research, in addition to the Best Overall Strathclyde Teaching Excellence Award 2013 for her teaching. She sits on the editorial boards for 17 journals.

Close

Martin J. D'Souza
Vaccine Nanotechnology Laboratory
Mercer University
Atlanta, GA
(USA)
Biography
×

Biography of Martin J. D'Souza

Dr. Martin J. D'Souza obtained his Ph.D. degree (1987) in Pharmaceutical Sciences from the University of Pittsburgh, Pittsburgh, PA, USA. Dr. D'Souza is currently performing numerous roles at Mercer University, Atlanta, GA, USA, i.e. Professor & Director of Graduate Programs in the College of Pharmacy. He is the Director of Mercer Clinical Laboratory, Co-Director of the Center for Drug Delivery Research, and Chair of the Pharmaceutics. He is the co-founder of Drug Delivery Therapeutics. His main fields of specialization include Vaccines, Pharmacokinetics, Bio-pharmaceutics, Bio-technology, etc.

Close

Biana Godin
Department of Nanomedicine
The Methodist Hospital Research Institute
Houston, TX
(USA)

Khaled F. Greish
Department of Molecular medicine
Arabian Gulf University
Manama
(Bahrain)
Biography
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Biography of Khaled F. Greish

Khaled Greish is Associate Professor of Molecular Medicine, and head of the Nano-research unit, at Princes Al-Jawhara Centre, Arabian Gulf University, Kingdom of Bahrain, and Adjunct Associate Professor of Pharmaceutical Chemistry at University of Utah, USA. He Published > 70 peer reviewed papers, and 10 book chapters in the field of targeted anticancer drug delivery. Controlled Release Society (CRS) awarded him the CRS Postdoctoral Achievement award in 2008 and in 2010; he

was elected as the member of the CRC College of Fellows in 2014 at the University of Otago.

Close

Zhong Gu
National Engineering Research Center for Biomaterials
Sichuan University
Chengdu
(China)

Biography

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Biography of Zhong Gu

Professor Zhongwei Gu graduated from Peking University in 1981 and served as a senior visiting scholar in the Research Triangle Institute, RTP and the University of Utah, USA, respectively from 1984 to 1986 and 1991 to 1993. He was appointed as a Professor in 1994, and has thrice been the Chief Scientist of the National Basic Research Program of China (the 973 program) since 1999. He is a Fellow of International Union of Societies for Biomaterials Science and Engineering (FBSE). His current research activities focus on the biomedical polymers, nano-biomaterials and drug delivery systems and tissue engineering.

Close

Jianfeng Guo
School of Pharmaceutical Sciences
Jilin University
Changchun
(China)

Biography

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Biography of Jianfeng Guo

Dr. Jianfeng Guo, Ph.D., is a Professor of Nanomedicine at School of Pharmaceutical Sciences, Jilin University, China. He received his PhD in 2011 from University College Cork (UCC), Ireland. He was a Research Fellow at University of Michigan, Ann Arbor, followed by industrial working experience at the Viva Biotech Ltd., Shanghai, as a Project Manager. He then spent three years at UCC as a Senior Research Fellow, prior to joining in Jilin University in 2016. He was awarded the Embark Initiative Postgraduate Scholarship, Chinese Government Award for Outstanding Self-financed Students Abroad. Dr. Jianfeng Guo has published 24 peer-reviewed scientific articles.

Close

Umesh Gupta
Department of Pharmacy
Central University of Rajasthan
Ajmer
(India)
Biography
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Biography of Umesh Gupta

Dr. Umesh Gupta, currently working as Assistant Professor in the Department of Pharmacy, Central University of Rajasthan, India. He did Ph.D. in Pharmaceutical Sciences from Dr. H. S. Gour University, Sagar, India under the mentorship of Prof. NK Jain. He has recently been awarded “DAAD Research Stays for Academics and Scientists” at Leibniz-institut fur Polymerforschung Dresden, Germany. He has the past experience of working as Research Scientist at Ranbaxy Research Laboratories, India and Post-Doctoral Research Associate at South Dakota State University, USA. He joined the Central University of Rajasthan in the year 2013.

Close

Lisbeth Illum
IDentity - Pharmaceutical Consultancy
Nottingham
(UK)
Biography
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Biography of Lisbeth Illum

Professor Lisbeth Illum was the founder and Managing Director of DanBioSyst UK Ltd a drug delivery technology company, sold successfully to West Pharmaceutical Services and now Archimedes Lab Ltd. She was the CEO of Critical Pharmaceuticals Ltd a drug delivery company. She now works as a consultant to the pharmaceutical industry and exert witness in patent litigations. She was awarded M. Pharm, Ph. D and D.Sc. from the Royal Danish School of Pharmacy in 1972, 1978 and 1988, respectively. Her research expertise is in the area of novel drug delivery systems for difficult drugs, such as hydrophilic and insoluble drugs, peptide and proteins. She has published more than 350 scientific papers, co-edited four books and filed more than 45 patent family applications on novel drug delivery systems, of which a large number of patents have been granted. She has lectured extensively throughout the world at conferences and workshops. She is a Fellow of the AAPS and CRS. She has been on the editorial boards of eleven scientific journals.

Close

Kazunori Kataoka
Department of Materials Engineering
University of Tokyo
Tokyo
(Japan)

Xin-Gui Li
College of Environmental Science & Engineering
Tongji University
Shanghai
(China)
Biography
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Biography of Xin-Gui Li

Dr. Xinn- Guii Lii obtained PhD in Polymer Materials from China Textile University, Shanghai. He is presently serving as Professor of Polymer Materials and Director of Inst. of Mater Chem at Tongji University, Shanghai, China. He has been recognized with many awards and honors such as ACS Membership Award in 2015, Natural Science Prize in 2015 and many other awards. He is also a member of different organizations such as ACS, National Engineering Research Center of Electronic Circuits Base Materials of China, Key Laboratory of Advanced Polymer Materials, Shanghai, China, Educational Ministry of China, and Shanghai Key Laboratory for Advanced Polymer Materials.

Close

Ulrich Lächelt
Department of Pharmacy
Ludwig Maximilian University of Munich
Munich
(Germany)
Biography
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Biography of Ulrich Lächelt

Ulrich Lächelt studied pharmaceutics at the University of Heidelberg and received a doctoral degree in Pharmaceutical Biology at the LMU Munich in 2014. He worked on multifunctional sequence-defined nucleic acid carriers together with Prof. Ernst Wagner. Since 2017 he continues the research on drug delivery and nanomedicine as junior research group leader and candidate for habilitation. He is an extraordinary member of the Center for NanoScience (CeNS) at the LMU. His research

focuses on the intracellular delivery of biomacromolecules, such as nucleic acids, peptides and proteins, the development of drug conjugates and inorganic-organic hybrid nanopharmaceuticals.

Close

Achuthamangalam B. Madhankumar
Department of Neurosurgery
Pennsylvania State University
Hershey, PA
(USA)

Tamara Minko
Department of Pharmaceutics
Rutgers University
Piscataway, NJ
(USA)

Biography

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Biography of Tamara Minko

Tamara Minko, Ph.D., is a Distinguished Professor and Chair of the Department of Pharmaceutics at Rutgers University. Her current research interests include nanotechnology; drug delivery; personalized nanomedicine; molecular targeting; nucleic acids delivery; mechanisms of multidrug resistance; bioimaging; preclinical evaluation of new therapeutics; and modulation of cell death mechanisms during hypoxia. Professor Minko is author and coauthor of more than 400 publications. Dr. Minko is an elected Fellow of CRS, AAPS, and AIMBE; recipient of numerous awards. She also is an Executive Editor of Advanced Drug Delivery Reviews, Editor of Pharmaceutical Research, President-Elect of the Controlled Release Society.

Close

Teresa Musumeci
Department of Drug Science
University of Catania
Catania
(Italy)

Biography

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Biography of Teresa Musumeci

Teresa Musumeci is an assistant professor and research scientist in the Department of Drug Sciences at the University of Catania, since 2008. Teresa Musumeci received her Pharmacy degree from the University of Catania (Italy) in 2001. She received her PhD in Pharmaceutical Technology from the University of Palermo (Italy) in 2007. She is the author of 30 per-reviewed papers and 2 book chapters. Her scientific activity is focused on design and characterization of nanocarriers for delivery of drugs.

Close

Caitriona O'Driscoll
School of Pharmacy
University College Cork
Cork
(Ireland)

Kamla Pathak
Department of Pharmaceutics
Uttar Pradesh University of Medical Sciences
Etawah
(India)
Biography

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Biography of Kamla Pathak

Professor Kamla Pathak, Professor and Head of the Department of Pharmaceutics, Pharmacy College Saifai, U. P. RIMS&R, Saifai, Etawah, India has a teaching and research experience of more than 26 years. She is actively engaged in research on oral controlled /modulated/targeted and topical drug delivery systems. She has over 200 publications in journals of international and national repute, 3 patents, authored book chapters and more than 180 abstracts of the papers presented in scientific forums to her credit. She has supervised Ph.Ds, more than 120 postgraduate theses and has a h-index of 21.

Close

Qiang Peng
West China Hospital of Stomatology
Sichuan University
Chengdu
(China)
Biography

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Biography of Qiang Peng

Dr. Qiang Peng obtained his B.S. degree (2006), M.A. degree (2009), and Ph.D in pharmaceutics (2012) from Sichuan University, China. He joined West China Hospital of Stomatology, Sichuan University as a lecturer in 2012 and promoted as an associate professor in 2014. Dr. Peng once worked in Keele University from 2010 to 2011 and in University of Copenhagen during 2015. His research focuses on nanomaterials-based advanced drug delivery. As a young scientist, he has published more than 20 publications. He won the Sichuan Provincial Award of Outstanding PhD Dissertation in 2014 and the First Prize of Chinese Outstanding Young Investigator Award, IADR-China Division in 2014.

Close

Stefano Salmaso
Department of Pharmaceutical and Pharmacological Sciences
University of Padova
Padova
(Italy)

Biography

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Biography of Stefano Salmaso

Stefano Salmaso is associate professor in the Department of Pharmaceutical and Pharmacological Sciences of the University of Padova (Italy), where he teaches Technology of delivery and controlled release of drugs. He obtained his Ph.D. in Pharmaceutical Sciences in 2004 and the Master degree in Chemistry and Pharmaceutical Technology from the University of Padova. He held positions as assistant professor at the University of Padova and associate scientist at Northeastern University - Boston (USA) in 2005 and 2008. He is author of 58 peer-reviewed publications, 3 book chapters, and inventors of 3 international patents. His scientific activity is focused on the development of responsive “smart” nanocarriers for the delivery of drugs and biopharmaceutics.

Close

Helder Santos
Division of Pharmaceutical Technology, Faculty of Pharmacy
University of Helsinki
Helsinki
(Finland)

Biography

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Biography of Helder Santos

Dr. Santos obtained a doctorate (D.Sc.) in Chemical Engineering from the Helsinki University of Technology, Helsinki, Finland. Currently Dr. Santos is an

Adjunct Professor in Pharmaceutical Nanotechnology at the University of Helsinki, Finland. He has published more than 150 scientific publications. Dr. Santos serves as Editor and is in the Editorial Board of several international journals.

Close

Sevda Senel
Department of Pharmaceutical Technology
Ankara University
Ankara
(Turkey)
Biography

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Biography of Sevda Senel

Sevda Şenel is Professor at the School of Pharmacy at Hacettepe University, Ankara Turkey. Numerous international (NATO-CRG, NATO-CLG, British Council, EU-7-SME) and national (TUBITAK, SAN-TEZ) projects led her group to the development of non-invasive systems for drugs and vaccines via various mucosae (buccal, sublingual and nasal) in human and veterinary field. Dr. Şenel and her research group has been awarded a number of prestigious honors including AAPS-PharmSciTech Best Poster Award (2015), Hacettepe University Science Award (2011), The Distinguished Scientist Award - by the Academy of Science of the Turkish Pharmacists Association (2010), CRSIntervet Best Veterinary Paper Award (2005) and the Novartis Pharmaceutical Technology Research Award (2004). Dr. Şenel is the author of more than 150 research publications, which includes original research and book chapters.

Close

Amanda K.A. Silva
Laboratoire Matière et Systèmes Complexes (UMR 7057)
Paris Diderot University
Paris
(France)
Biography

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Biography of Amanda K.A. Silva

Amanda K. A. Silva obtained a degree in Pharmacy in 2005 at UFRN, Brazil, and a PhD in Pharmaceutical Technology in 2008 in the domain of gastro-resistant magnetic microcapsules. She obtained a second PhD in Cellular and Molecular Biology in 2010 from the Université d'Evry, France concerning polysaccharides for thermo-controlled cell culture in 3D. In 2013, Amanda obtained a tenured CNRS

researcher position at Matter and Complex Systems lab in Paris. She works in physical approaches for regenerative medicine, extracellular vesicle engineering, theranosis and photo-activated therapies. Amanda has published 37 papers and is an inventor in 4 patents.

Close

Vladimir P. Torchilin
Center for Pharmaceutical Biotechnology and Nanomedicine
Northeastern University
Boston, MA
(USA)

Biography

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Biography of Vladimir P. Torchilin

Vladimir P. Torchilin, Ph.D., D.Sc. is a University Distinguished Professor of Pharmaceutical Sciences and Director, Center for Pharmaceutical Biotechnology and Nanomedicine, Northeastern University, Boston. His interests include drug delivery and targeting, nanomedicine, multifunctional and stimuli-sensitive pharmaceutical nanocarriers, biomedical polymers, experimental cancer therapy. He has published more than 400 original papers, more than 150 reviews and book chapters, wrote and edited 12 books, and holds more than 40 patents. Google Scholar has shown more than 44,000 citations of his papers with an H-index of 96. He is Editor-in-Chief of Current Drug Discovery Technologies, Drug Delivery, and OpenNano, Co-Editor of Current Pharmaceutical Biotechnology and on the Editorial Boards of many other journals. He received more than $30 M from the governmental and industrial sources in research funding. He has multiple honors and awards and in 2011, Times Higher Education ranked him number 2 among the top world scientists in pharmacology for the period of 2000-2010.

Close

Ernst Wagner
Department of Pharmacy, and Center for Nanoscience (CeNS)
Ludwig-Maximilians-Universität (LMU)
Munich
(Germany)

Biography

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Biography of Ernst Wagner

Dr. Wagner is Professor of Pharmaceutical Biotechnology at Ludwig-Maximilians-Universität Munich and a member of the Munich Center for Nanoscience. He coordinates ‘Biomedical Nanotechnologies’ of the Excellence

Cluster ‘Nanosystems Initiative Munich’. After a Ph.D. in Chemistry from the Technical University of Vienna and a postdoctoral stay at the ETH Zurich, he was the group leader at the IMP Vienna and Director for Cancer Vaccines at Boehringer Ingelheim Austria. Dr. Wagner has authored more than 390 publications with an h-index 70. He has been a board member of the German Society for Gene Therapy, Committee member of ASGCT, and BSA member of the CRS.

Close

Roderick Bryan Walker
Division of Pharmaceutics
Rhodes University
Grahamstown
(South Africa)
Biography

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Biography of Roderick Bryan Walker

Professor Walker completed his Ph.D. degree in Biopharmaceutics and Pharmacokinetics at Rhodes University in Grahamstown, South Africa. He is the former Dean and Head of the Faculty of Pharmacy at Rhodes and is currently the Professor of Pharmaceutics and is the current chair of the Academy of Pharmaceutical Sciences in South Africa. Professor Walker has published and presented over 200 scientific outputs and serves on the editorial boards of a number of journals. Professor Walker undertakes research studies in all aspects of drug delivery and product development.

Close

Zimei Wu
School of Pharmacy
University of Auckland
Auckland
(New Zealand)
Biography

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Biography of Zimei Wu

Zimei Wu is an Associate Professor at the School of Pharmacy, University of Auckland, New Zealand (NZ). She holds a PhD from University of Otago (NZ) and a Masters from China Pharmaceutical University. Her ‘liposomes’ research has attracted wide collaborations. She received an NZ-China Scientist Exchange Award from the Royal Society of NZ. She also researches transdermal delivery with successful stories featured on NZ TV3. Zimei also serves on editorial boards of

Journal of Liposome Research, and Pharmaceutical Development and Technology and a referee for >20 journals. Zimei was the past President of NZ Local Chapter of Controlled Release Society.

Close

Shirley Wu
Department of Pharmaceutical Sciences
University of Toronto
Toronto, ON
(Canada)

Sarita K. Yadav
Department of Pharmacy
MLN Medical College Prayagraj
Uttar Pradesh
(India)

Biography

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Biography of Sarita K. Yadav

Dr. Sarita K Yadav obtained her B. Pharm from DIPSAR and earned her M. Pharm and Ph.D. from IIT(BHU), India. Currently, she is working as Assistant Professor at MLN Medical College, Prayagraj. She has qualified GATE 2009 with AIR-32. She had worked for two years as drug analyst in testing of drugs and cosmetics products at UPFSDA, Lucknow. She had received “Young Scientist Award-WF” in 2015 by SPER for her research contributions. She holds lifetime membership of APTI, IPGA, SPER, and PRISAL. She is a member of editorial board of Micro and Nano System (MNS) by Bentham Science, IJBST journal group and peer reviewer in Future Journal of Pharmaceutical Sciences, Saudi Pharmaceutical Journal etc. Currently, she has many research/reviews papers to her credit in high impact journals with total impact factor around 60.

Close

Yanjun Zhao
Department of Pharmaceutics
Tianjin University
Tianjin
(China)

Biography

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Biography of Yanjun Zhao

Prof. Zhao is a Full Professor of Pharmaceutics in the School of Pharmaceutical Science and Technology, Health Science Platform, Tianjin University. He obtained the Bachelor (Polymer), Master (Engineering), and PhD (Pharmacy) degree from Dalian University of Technology, Dalian Institute of Chemical Physics (CAS), and King's College London, respectively. His research interests focus on pharmaceutical micelles, stimuli-responsive drug delivery, and ferroptosis antitumor nanomedicine.

Close

Associate Editorial Board Members

Goutam Mondal
Postdoctoral Research Associate
National Center for Natural Products Research
University of Mississippi
Oxford, MS
(USA)
Biography

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Biography of Goutam Mondal

Dr. Goutam Mondal is an emerging pharmaceutics and drug delivery scientist. He is an expert in the design and synthesis of receptor targeted lipids and polymeric systems, the techniques of animal tissue culture, tumor growth inhibition studies, and pharmacokinetics studies of small molecules. Presently, he is associated with Dr. Ikhlas A Khan's research group under supervision of Dr. Ryan Yates at the National Center for Natural Products Research, University of Mississippi, USA where he is actively involved in pre-clinical and clinical pharmacokinetics and pharmacodynamics of natural products. He has published 21 research articles in high impact peer-reviewed journals.

Close

Mariane L. Nogueira
Department of Pharmacy
Federal University of Pernambuco
Recife
(Brazil)
Biography

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Biography of Mariane L. Nogueira

Dr. Mariane Lira Nogueira is a Pharmacist. She obtained Master's degree in Pharmaceutical Sciences, and Ph.D. in Biological Sciences with an emphasis on Biotechnology. She completed an interuniversity exchange doctorate in Pharmacotechnics (2007-2008) at the Faculté de Pharmacie - Université Paris Sud 11 and an internship at the Universidad de Navarra (2008). She did Post-doc from the Université Paris Saclay (2014-2015). She is currently an Associate Professor at the Federal University of Pernambuco, Brazil, a researcher at the Keizo-Asami Immunopathology Laboratory, and leader of Nanotechnology, Biotechnology, and Cell Culture Research Group. Her research fields are mainly focused on the development and characterization of surface-modified nanocarriers for biomedical applications.

Close

Meysam Omidi
Protein Research Centre
Shahid Beheshti University G.C.
Tehran, Velenjak
(Iran)
Biography

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Biography of Meysam Omidi

Dr. Meisam Omidi is an Assistant Professor of Protein Research Center, Shahid Beheshti University. Dr. Omari’s research is focused on application of nanobiomaterials in soft, hard, and interfacial tissue engineering. He is particularly interested to design and fabricate smart nano drug delivery systems for regenerative medicine application. He has (co)authored over 80 research papers in the field of nanoscience and nanotechnology.

Close

Aniruddha Roy
Department of Pharmacy
Birla Institute of Technology and Science
Pilani
(India)
Biography

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Biography of Aniruddha Roy

Dr. Aniruddha Roy is currently working as an Assistant Professor in the Department of Pharmacy at Birla Institute of Technology and Science (BITS) -

Pilani, India. He is a Pharmaceutical Technologist by training. He completed PhD in Immunology from National Institute of Immunology (NII), New Delhi, India. His main area of PhD thesis work was immunotherapy of cancer. After PhD, he worked at the Indian Institute of Technology, New Delhi, Ontario Institute for Cancer Research at the University of Toronto, Canada, and University of British Columbia, Canada in various capacities. He has more than ten years of research experience. His research is primarily focused on nanomedicine and targeted drug delivery in different diseases.

Close

Executive Guest Editor(s)

Ismail Ocsoy
Department of Analytical Chemistry
Erciyes University
Kayseri
(Turkey)
Biography

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Biography of Ismail Ocsoy

Dr. Ismail Ocsoy is a Professor in the faculty of Pharmacy, Erciyes University, Kayseri, Turkey. He completed his MS and Ph.D. in Chemistry from the Department of Chemistry, University of Florida, USA. His research focuses on Nano biotechnology consisting of DNA Aptamer conjugated nanomaterial, cancer therapy models, anti-cancer, antimicrobial agents and Nano bio-sensor for detection of antibiotic resistant bacteria. He has published more than 70 papers in highly reputable and prestigious journals.

Close

- Editor-in-Chief
- Co-Editors
- Associate Editors
- Regional Editors
- Section Editors
- Editorial Board Members
- Associate Editorial Board Members
- Executive Guest Editor(s)

Editor-in-Chief

Zongjin Li
Department of Pathophysiology
Nankai University School of Medicine
Tianjin
(China)
Biography
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Biography of Zongjin Li

Dr. Zongjin Li is a Professor at the Department of Pathophysiology and a Director of the Laboratory of Molecular Imaging and Stem Cell Therapy at Nankai University School of Medicine, Tianjin, China. He received his PhD degree from Peking Union Medical College and completed his postdoctoral training in the Molecular Imaging Program (MIPS) at Stanford University, USA. He has published more than 120 peer-reviewed papers on molecular imaging and stem cell therapy.

Close

Co-Editors

Jay B. Ramapuram
Department of Drug Discovery and Development
Harrison School of Pharmacy
Auburn, AL
(USA)
Biography
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Biography of Jay B. Ramapuram

Dr. Ramapuram Jayachandra Babu is currently a Professor and Graduate Program Officer at the Department of Drug Discovery and Development, Harrison School of Pharmacy, Auburn University. He received his Bachelor's degree in Pharmacy from the University of Madras and Masters and PhD degrees in Pharmaceutics from Indian Institute of Technology, Varanasi, India. His research interests include formulation development of nanoparticle based formulations for topical and oral delivery, solubility improvement of insoluble drugs, percutaneous penetration enhancement techniques, and transdermal drug delivery systems. He has authored and co-authored over 90 peer reviewed papers and 100 conference abstracts in several national and international conferences. He has served as a chair and co-

chair of scientific sessions at the Annual National Meetings of American Association of Pharmaceutical Scientists and Society of Toxicology. He serves as an editorial board member for five journals and as a peer reviewer for more than forty journals. His field of expertise are Transdermal Drug Delivery; Nanoparticles, Solubility improvement; Ocular Drug Delivery.

Close

Associate Editors

Maria J. Blanco-Prieto
Department of Pharmacy and Pharmaceutical Technology
University of Navarra
Pamplona
(Spain)

Biography

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Biography of Maria J. Blanco-Prieto

Maria J. Blanco-Prieto received her degree of Pharmacy Degree from the University of Santiago de Compostela (Spain), followed by a PhD in Pharmaceutical Sciences from the University of Paris-Sud (France). She completed post-doctoral training at the Swiss Federal Institute of Technology (ETH), Zürich, (Switzerland) and then joined the University of Navarra where presently she is a Full Professor of Pharmacy and Pharmaceutical Technology. Her research interest is in the field of biomaterials and advanced drug carrier systems including the design and the development of polymer and lipid based micro- and nanoscale carriers, their biological evaluation in in vitro cell cultures and also their pharmacokinetic and dynamic impact in vivo (using relevant animal models of the diseases).

Close

Darryl T. Martin
Department of Urology
Yale University School of Medicine
New Haven, CT
(USA)

Biography

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Biography of Darryl T. Martin

Dr. Darryl T. Martin is a Research Scientist at the Yale School of Medicine. He obtained his PhD from the Division of Biomedical Sciences, the Memorial University of Newfoundland in 2010. His research interests include drug delivery

systems that target prostate and bladder cancers using nanoparticle-based platforms for diagnostic and therapeutic purposes.

Close

Yu Nie
Department of Biomedical Engineering
Sichuan University (SCU)
Chengdu
(China)
Biography

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Biography of Yu Nie

Dr. Yu Nie obtained PhD in Pharmaceutical Sciences from West China School of Pharmacy, Sichuan University, China. She is presently serving as a Professor at NERCB, Sichuan University, China and before that she was an Assistant Professor at the same institution. She also has an experience as a postdoc fellow at Ludwig-Maximilian-University of Munich, Germany. Her research interests include Regenerated bio-materials, medicinal excipients in ophthalmology and Orthopedics. She has contributed more than 50 publications, having citations around 1050.

Close

Regional Editors

Asia

Farid Dorkoosh
Department of Pharmaceutics
Tehran University of Medical Sciences
Tehran
(Iran)
Biography

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Biography of Farid Dorkoosh

Dr. Dorkoosh received his PhD in pharmaceutics and biopharmaceutics from Leiden University, the Netherlands in 2002. He followed an international training on intellectual property and management of innovation at World Intellectual Property Organization (WIPO) in Geneva, Switzerland in 2005.

He got his Diploma in management from Chartered Management Institute of London, UK in 2009. He is currently an associate professor at Tehran University of Medical Sciences. He is also the head of Patent office of Tehran University of Medical Sciences. Dr. Dorkoosh has published more than 80 research articles and held 10 patents and patent applications.

Close

Murugan Ramalingam
Centre for Stem Cell Research
Christian Medical College Campus
Vellore
(India)

Biography

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Biography of Murugan Ramalingam

Dr. Murugan Ramalingam is a Professor at the Centre for Stem Cell Research (India). Concurrently, he is an Adjunct Professor at the Tohoku University (Japan). He worked as Associate Professor at the Université de Strasbourg (France) and Assistant Professor at the WPI-Advanced Institute for Materials Research (Japan). He has also worked at the U.S. National Institute of Standards and Technology (NIST) and the National Institutes of Health (NIH). He received his Ph.D. in Biomaterials from the University of Madras. He is the author of over 260 scientific publications.

Close

Europe

Clare Hoskins
Director of Postgraduate Research Medical Sciences (Laboratory)
Keele University
Newcastle, England
(United Kingdom)

Biography

×

Biography of Clare Hoskins

Dr. Clare Hoskins obtained PhD in Pharmaceutics from Robert Gordon University, Aberdeen. She is presently serving as a Senior Lecturer in Pharmaceutics at Keele University. She is a member of different professional bodies such as Royal Society of Chemistry, Controlled Released Society,

British Nano-medicine Society and Higher Education Academy. She has contributed numerous publications in different national and international journals. She also possesses different editorial responsibilities in different journals as a guest editor and editorial board member.

Close

North America

Glen S. Kwon
School of Pharmacy-Wisconsin Center for NanoBioSystems
University of Wisconsin
Madison, WI
(USA)
Biography

×

Biography of Glen S. Kwon

Dr. Kwon is the Jens T. Carstensen Distinguished Chair Professor in the School of Pharmacy at University of Wisconsin. He received the Jorge Heller Journal of Controlled Release/Controlled Release Society (CRS) Outstanding Paper Award (1994) and CRS Young Investigator Research Achievement Award (2003). He is a Fellow of the American Association of Pharmaceutical Scientists (2012) and a highly-cited researcher by Thomson Reuters in the category of Pharmacology & Toxicology (2014). He is co-founder of Co-D Therapeutics Inc., a start-up company dedicated to multi-drug anticancer nanotherapeutics.

Close

Section Editors

Biodegradable polymers for nanomedicine

Rohidas Arote
Department of Molecular Genetics
Seoul National University
Seoul
(South Korea)
Biography

×

Biography of Rohidas Arote

Prof. Arote Rohidas is an Associate Professor and the director of Nanomedicine Laboratory in the Dept. of Molecular Genetics, School of Dentistry, Seoul National University. His research includes nanotechnology, drug delivery, molecular targeting, nucleic acid delivery, bioimaging and modulation of cell death mechanism has been published in over 50 international journals and also produced various patents.

Close

Editorial Board Members

Hua Ai
Department of Radiology
Sichuan University
Chengdu
(China)

Alaa A. Aljabali
Faculty of Pharmacy
Yarmouk University
Irbid
(Jordan)
Biography

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Biography of Alaa A. Aljabali

Alaa A. Aljabali completed MRes in cancer biomarkers from Essex University and a Ph.D. in Bionanotechnology from John Innes Centre (UK). He worked as a postdoctoral research fellow at the University of Oxford on the development of nanoparticles as clinical imaging agents. Recently, he completed Fellowship in Responsible Conduct of Research at the University of California San Diego. His research interest are Biomaterials, Drug delivery and targeting, Material science, and Nanomedicine.

Close

Christine Allen
Leslie Dan Faculty of Pharmacy
University of Toronto
Toronto, ON

(Canada)
Biography
×

Biography of Christine Allen

Christine Allen is the GlaxoSmithKline Chair in Pharmaceutics and Drug Delivery and a Professor in the Leslie Dan Faculty of Pharmacy and the Departments of Chemical Engineering and Applied Chemistry and IBBME at the University of Toronto. Allen's research is focused on the design and development of new materials and technologies for the delivery of drugs and contrast agents. Her research has resulted in well over 100 peer-reviewed publications, numerous patent applications and book chapters on both lipid and polymer-based drug delivery systems. She is also the co-founder and President of Nanovista Inc., a start-up housed in Johnson & Johnson Innovations JLabs @Toronto, which is focused on the development of multimodal contrast agents to improve the performance of image-guided high precision cancer therapy.

Close

Stephanie Allen
School of Pharmacy
University of Nottingham
Nottingham
(UK)

Giulio Caracciolo
Department of Molecular Medicine
University of Rome
Rome
(Italy)
Biography
×

Biography of Giulio Caracciolo

Giulio Caracciolo is Professor at the Molecular Medicine Department of the Sapienza University of Rome. He is mainly interested in understanding the bio–nano interactions between nanodelivery systems and physiological environments. The relationships between synthetic identity, biological identity and physiological response of drug delivery systems will enable researchers to predict their outcome after administration in vivo. This would represent a truly new paradigm in the field of pharmaceutics and nanomedicine.

Close

Bin Chen
State Key Laboratory of Multiphase Flow in Power Engineering
Xi'an Jiaotong University
Xi'an Shi
(China)
Biography
×

Biography of Bin Chen

Dr. Bin Chen is now a Full Professor and Vice Director at the State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University. He received his Ph.D in 2002 from Xi'an Jiaotong University, China. Afterwards, he worked as Postdoctoral Research Fellow of Japan Society for the Promotion of Science from 2002 to 2004. For more than a decade, Dr. Chen has devoted his efforts to the research on laser dermatology, in particular with the laser treatment of Port Wine Stain. He is currently working on photothermal-activatable liposomal drug delivery, blood absorption enhancement by nano-particle, as well as animal experiment on thermal damage of blood capillary by 595nm and 1064nm laser. He has published over 50 peer-reviewed journal papers and was invited for more than 20 keynote speeches.

Close

Pieter Cullis
Biochemistry and Molecular Biology
University of British Columbia
Vancouver, BC
(Canada)
Biography
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Biography of Pieter Cullis

Pieter R. Cullis, Ph.D. FRSC is the Director of Life Sciences Institute at the University of British Columbia (UBC) He is a Professor in the Department of Biochemistry and Molecular Biology and Director of the, NanoMedicines Research Group, UBC. Dr. Cullis and co-workers made fundamental advances in the generation, loading and targeting of lipid nanoparticle (LNP) systems for intravenous delivery of small molecule drugs and macromolecular drugs such as small interfering RNA (siRNA). This work has contributed to three drugs that have been approved by regulatory agencies in the U.S. and Europe for the treatment of cancer and its complications. Dr. Cullis has co-founded ten biotechnology companies, has published over 300 scientific articles and is an inventor of over 60 patents. He also co-founded the BC Personalized Medicine Initiative in 2012. Dr. Cullis received many awards and was elected as the Fellow of the Royal Society of Canada in 2004 and was awarded the Prix Galien, Canada's premier prize for achievements in pharmaceutical R&D, in 2011.

Close

Sudip Das
Department of Pharmaceutics & Drug Delivery
Butler University, College of Pharmacy and Health Sciences
Indianapolis, IN
(USA)
Biography
×

Biography of Sudip Das

Dr. Sudip Das is a professor of pharmaceutical sciences at Butler University, College of Pharmacy & Health Sciences. He is also an Adjunct Professor in the School of Medicine, Indiana University. He was the chair of the department of pharmaceutical sciences and the director of the graduate program in pharmaceutical sciences at Butler University. Dr. Das has over thirty years of teaching and research experience in the professional pharmacy and graduate programs in the USA and Canada. His current research involves targeted delivery of siRNA and anticancer drugs for the treatment of breast cancer and glioblastoma. Dr. Das has over 150 research publications, review articles, patents, proceedings, conference presentations, and book chapters, is a recipient of multiple awards/honors, and has secured extramural research funding from NIH, PDA, and several pharmaceutical industries.

Close

Nunzio Denora
Department of Pharmacy
University of Bari Aldo Moro
Bari
(Italy)
Biography
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Biography of Nunzio Denora

Nunzio Denora received the degree in Chemistry and Pharmaceutical Technology from the University of Bari in 2001 and obtained his Ph.D. in Pharmaceutical Technology from the University of Palermo in 2004. After a postdoctoral position in the Department of Pharmaceutical Chemistry at Kansas University (2005-2006), he was appointed as assistant professor and research scientist of Pharmaceutical Technology in the Department of Pharmacy - Drug Sciences of the University of Bari. He has published more than 80 articles, is author of 3 book chapters, more than100 posters and several oral presentations and is inventor of 3 patents.

Close

Christine Dufès
Strathclyde Institute of Pharmacy and Biomedical Sciences
University of Strathclyde
Glasgow
(UK)
Biography
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Biography of Christine Dufès

Dr. Christine Dufès is a Senior Lecturer at the Strathclyde Institute of Pharmacy and Biomedical Sciences (SIPBS), University of Strathclyde, Glasgow, United Kingdom. She obtained a Doctorate in Pharmacy and a PhD from the University of Poitiers (France). Her research interests include the targeted delivery of drugs and therapeutic genes to tumours and cerebral diseases. She has been awarded the Biochemical Journal Young Investigator Award (2009) and the Tom Gibson Memorial Award (2012) for her research, in addition to the Best Overall Strathclyde Teaching Excellence Award 2013 for her teaching. She sits on the editorial boards for 17 journals.

Close

Martin J. D'Souza
Vaccine Nanotechnology Laboratory
Mercer University
Atlanta, GA
(USA)
Biography
×

Biography of Martin J. D'Souza

Dr. Martin J. D'Souza obtained his Ph.D. degree (1987) in Pharmaceutical Sciences from the University of Pittsburgh, Pittsburgh, PA, USA. Dr. D'Souza is currently performing numerous roles at Mercer University, Atlanta, GA, USA, i.e. Professor & Director of Graduate Programs in the College of Pharmacy. He is the Director of Mercer Clinical Laboratory, Co-Director of the Center for Drug Delivery Research, and Chair of the Pharmaceutics. He is the co-founder of Drug Delivery Therapeutics. His main fields of specialization include Vaccines, Pharmacokinetics, Bio-pharmaceutics, Bio-technology, etc.

Close

Biana Godin
Department of Nanomedicine
The Methodist Hospital Research Institute
Houston, TX
(USA)

Khaled F. Greish
Department of Molecular medicine
Arabian Gulf University
Manama
(Bahrain)
Biography
×

Biography of Khaled F. Greish

Khaled Greish is Associate Professor of Molecular Medicine, and head of the Nano-research unit, at Princes Al-Jawhara Centre, Arabian Gulf University, Kingdom of Bahrain, and Adjunct Associate Professor of Pharmaceutical Chemistry at University of Utah, USA. He Published > 70 peer reviewed papers, and 10 book chapters in the field of targeted anticancer drug delivery. Controlled Release Society (CRS) awarded him the CRS Postdoctoral Achievement award in 2008 and in 2010; he was elected as the member of the CRC College of Fellows in 2014 at the University of Otago.

Close

Zhong Gu
National Engineering Research Center for Biomaterials
Sichuan University
Chengdu
(China)
Biography
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Biography of Zhong Gu

Professor Zhongwei Gu graduated from Peking University in 1981 and served as a senior visiting scholar in the Research Triangle Institute, RTP and the University of Utah, USA, respectively from 1984 to 1986 and 1991 to 1993. He was appointed as a Professor in 1994, and has thrice been the Chief Scientist of the National Basic Research Program of China (the 973 program) since 1999. He is a Fellow of International Union of Societies for Biomaterials Science and Engineering (FBSE). His current research activities focus on the biomedical polymers, nano-biomaterials and drug delivery systems and tissue engineering.

Close

Jianfeng Guo
School of Pharmaceutical Sciences
Jilin University
Changchun

(China)
Biography
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Biography of Jianfeng Guo


Dr. Jianfeng Guo, Ph.D., is a Professor of Nanomedicine at School of Pharmaceutical Sciences, Jilin University, China. He received his PhD in 2011 from University College Cork (UCC), Ireland. He was a Research Fellow at University of Michigan, Ann Arbor, followed by industrial working experience at the Viva Biotech Ltd., Shanghai, as a Project Manager. He then spent three years at UCC as a Senior Research Fellow, prior to joining in Jilin University in 2016. He was awarded the Embark Initiative Postgraduate Scholarship, Chinese Government Award for Outstanding Self-financed Students Abroad. Dr. Jianfeng Guo has published 24 peer-reviewed scientific articles.

Close

Umesh Gupta
Department of Pharmacy
Central University of Rajasthan
Ajmer
(India)
Biography
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Biography of Umesh Gupta


Dr. Umesh Gupta, currently working as Assistant Professor in the Department of Pharmacy, Central University of Rajasthan, India. He did Ph.D. in Pharmaceutical Sciences from Dr. H. S. Gour University, Sagar, India under the mentorship of Prof. NK Jain. He has recently been awarded “DAAD Research Stays for Academics and Scientists” at Leibniz-institut fur Polymerforschung Dresden, Germany. He has the past experience of working as Research Scientist at Ranbaxy Research Laboratories, India and Post-Doctoral Research Associate at South Dakota State University, USA. He joined the Central University of Rajasthan in the year 2013.

Close

Lisbeth Illum
IDentity - Pharmaceutical Consultancy
Nottingham
(UK)
Biography
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Biography of Lisbeth Illum

Professor Lisbeth Illum was the founder and Managing Director of DanBioSyst UK Ltd a drug delivery technology company, sold successfully to West Pharmaceutical Services and now Archimedes Lab Ltd. She was the CEO of Critical Pharmaceuticals Ltd a drug delivery company. She now works as a consultant to the pharmaceutical industry and exert witness in patent litigations. She was awarded M. Pharm, Ph. D and D.Sc. from the Royal Danish School of Pharmacy in 1972, 1978 and 1988, respectively. Her research expertise is in the area of novel drug delivery systems for difficult drugs, such as hydrophilic and insoluble drugs, peptide and proteins. She has published more than 350 scientific papers, co-edited four books and filed more than 45 patent family applications on novel drug delivery systems, of which a large number of patents have been granted. She has lectured extensively throughout the world at conferences and workshops. She is a Fellow of the AAPS and CRS. She has been on the editorial boards of eleven scientific journals.

Close

Kazunori Kataoka
Department of Materials Engineering
University of Tokyo
Tokyo
(Japan)

Xin-Gui Li
College of Environmental Science & Engineering
Tongji University
Shanghai
(China)
Biography

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Biography of Xin-Gui Li

Dr. Xinn- Guii Lii obtained PhD in Polymer Materials from China Textile University, Shanghai. He is presently serving as Professor of Polymer Materials and Director of Inst. of Mater Chem at Tongji University, Shanghai, China. He has been recognized with many awards and honors such as ACS Membership Award in 2015, Natural Science Prize in 2015 and many other awards. He is also a member of different organizations such as ACS, National Engineering Research Center of Electronic Circuits Base Materials of China, Key Laboratory of Advanced Polymer Materials, Shanghai, China, Educational Ministry of China, and Shanghai Key Laboratory for Advanced Polymer Materials.

Close

Ulrich Lächelt
Department of Pharmacy
Ludwig Maximilian University of Munich

Munich
(Germany)
Biography
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Biography of Ulrich Lächelt

Ulrich Lächelt studied pharmaceutics at the University of Heidelberg and received a doctoral degree in Pharmaceutical Biology at the LMU Munich in 2014. He worked on multifunctional sequence-defined nucleic acid carriers together with Prof. Ernst Wagner. Since 2017 he continues the research on drug delivery and nanomedicine as junior research group leader and candidate for habilitation. He is an extraordinary member of the Center for NanoScience (CeNS) at the LMU. His research focuses on the intracellular delivery of biomacromolecules, such as nucleic acids, peptides and proteins, the development of drug conjugates and inorganic-organic hybrid nanopharmaceuticals.

Close

Achuthamangalam B. Madhankumar
Department of Neurosurgery
Pennsylvania State University
Hershey, PA
(USA)

Tamara Minko
Department of Pharmaceutics
Rutgers University
Piscataway, NJ
(USA)
Biography
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Biography of Tamara Minko

Tamara Minko, Ph.D., is a Distinguished Professor and Chair of the Department of Pharmaceutics at Rutgers University. Her current research interests include nanotechnology; drug delivery; personalized nanomedicine; molecular targeting; nucleic acids delivery; mechanisms of multidrug resistance; bioimaging; preclinical evaluation of new therapeutics; and modulation of cell death mechanisms during hypoxia. Professor Minko is author and coauthor of more than 400 publications. Dr. Minko is an elected Fellow of CRS, AAPS, and AIMBE; recipient of numerous awards. She also is an Executive Editor of Advanced Drug Delivery Reviews, Editor of Pharmaceutical Research, President-Elect of the Controlled Release Society.

Close

Teresa Musumeci
Department of Drug Science
University of Catania
Catania
(Italy)
Biography
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Biography of Teresa Musumeci

Teresa Musumeci is an assistant professor and research scientist in the Department of Drug Sciences at the University of Catania, since 2008. Teresa Musumeci received her Pharmacy degree from the University of Catania (Italy) in 2001. She received her PhD in Pharmaceutical Technology from the University of Palermo (Italy) in 2007. She is the author of 30 per-reviewed papers and 2 book chapters. Her scientific activity is focused on design and characterization of nanocarriers for delivery of drugs.

Close

Caitriona O'Driscoll
School of Pharmacy
University College Cork
Cork
(Ireland)

Kamla Pathak
Department of Pharmaceutics
Uttar Pradesh University of Medical Sciences
Etawah
(India)
Biography
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Biography of Kamla Pathak

Professor Kamla Pathak, Professor and Head of the Department of Pharmaceutics, Pharmacy College Saifai, U. P. RIMS&R, Saifai, Etawah, India has a teaching and research experience of more than 26 years. She is actively engaged in research on oral controlled /modulated/targeted and topical drug delivery systems. She has over 200 publications in journals of international and national repute, 3 patents, authored book chapters and more than 180 abstracts of the papers presented in scientific forums to her credit. She has supervised Ph.Ds, more than 120 postgraduate theses and has a h-index of 21.

Close

Qiang Peng
West China Hospital of Stomatology
Sichuan University
Chengdu
(China)
Biography
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Biography of Qiang Peng

Dr. Qiang Peng obtained his B.S. degree (2006), M.A. degree (2009), and Ph.D in pharmaceutics (2012) from Sichuan University, China. He joined West China Hospital of Stomatology, Sichuan University as a lecturer in 2012 and promoted as an associate professor in 2014. Dr. Peng once worked in Keele University from 2010 to 2011 and in University of Copenhagen during 2015. His research focuses on nanomaterials-based advanced drug delivery. As a young scientist, he has published more than 20 publications. He won the Sichuan Provincial Award of Outstanding PhD Dissertation in 2014 and the First Prize of Chinese Outstanding Young Investigator Award, IADR-China Division in 2014.

Close

Stefano Salmaso
Department of Pharmaceutical and Pharmacological Sciences
University of Padova
Padova
(Italy)
Biography
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Biography of Stefano Salmaso

Stefano Salmaso is associate professor in the Department of Pharmaceutical and Pharmacological Sciences of the University of Padova (Italy), where he teaches Technology of delivery and controlled release of drugs. He obtained his Ph.D. in Pharmaceutical Sciences in 2004 and the Master degree in Chemistry and Pharmaceutical Technology from the University of Padova. He held positions as assistant professor at the University of Padova and associate scientist at Northeastern University - Boston (USA) in 2005 and 2008. He is author of 58 peer-reviewed publications, 3 book chapters, and inventors of 3 international patents. His scientific activity is focused on the development of responsive “smart” nanocarriers for the delivery of drugs and biopharmaceutics.

Close

Helder Santos
Division of Pharmaceutical Technology, Faculty of Pharmacy
University of Helsinki

Helsinki
(Finland)
Biography
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Biography of Helder Santos

Dr. Santos obtained a doctorate (D.Sc.) in Chemical Engineering from the Helsinki University of Technology, Helsinki, Finland. Currently Dr. Santos is an Adjunct Professor in Pharmaceutical Nanotechnology at the University of Helsinki, Finland. He has published more than 150 scientific publications. Dr. Santos serves as Editor and is in the Editorial Board of several international journals.

Close

Sevda Senel
Department of Pharmaceutical Technology
Ankara University
Ankara
(Turkey)
Biography
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Biography of Sevda Senel

Sevda Şenel is Professor at the School of Pharmacy at Hacettepe University, Ankara Turkey. Numerous international (NATO-CRG, NATO-CLG, British Council, EU-7-SME) and national (TUBITAK, SAN-TEZ) projects led her group to the development of non-invasive systems for drugs and vaccines via various mucosae (buccal, sublingual and nasal) in human and veterinary field. Dr. Şenel and her research group has been awarded a number of prestigious honors including AAPS-PharmSciTech Best Poster Award (2015), Hacettepe University Science Award (2011), The Distinguished Scientist Award - by the Academy of Science of the Turkish Pharmacists Association (2010), CRSIntervet Best Veterinary Paper Award (2005) and the Novartis Pharmaceutical Technology Research Award (2004). Dr. Şenel is the author of more than 150 research publications, which includes original research and book chapters.

Close

Amanda K.A. Silva
Laboratoire Matière et Systèmes Complexes (UMR 7057)
Paris Diderot University
Paris
(France)
Biography
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Biography of Amanda K.A. Silva

Amanda K. A. Silva obtained a degree in Pharmacy in 2005 at UFRN, Brazil, and a PhD in Pharmaceutical Technology in 2008 in the domain of gastro-resistant magnetic microcapsules. She obtained a second PhD in Cellular and Molecular Biology in 2010 from the Université d'Evry, France concerning polysaccharides for thermo-controlled cell culture in 3D. In 2013, Amanda obtained a tenured CNRS researcher position at Matter and Complex Systems lab in Paris. She works in physical approaches for regenerative medicine, extracellular vesicle engineering, theranosis and photo-activated therapies. Amanda has published 37 papers and is an inventor in 4 patents.

Close

Vladimir P. Torchilin
Center for Pharmaceutical Biotechnology and Nanomedicine
Northeastern University
Boston, MA
(USA)
Biography

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Biography of Vladimir P. Torchilin

Vladimir P. Torchilin, Ph.D., D.Sc. is a University Distinguished Professor of Pharmaceutical Sciences and Director, Center for Pharmaceutical Biotechnology and Nanomedicine, Northeastern University, Boston. His interests include drug delivery and targeting, nanomedicine, multifunctional and stimuli-sensitive pharmaceutical nanocarriers, biomedical polymers, experimental cancer therapy. He has published more than 400 original papers, more than 150 reviews and book chapters, wrote and edited 12 books, and holds more than 40 patents. Google Scholar has shown more than 44,000 citations of his papers with an H-index of 96. He is Editor-in-Chief of Current Drug Discovery Technologies, Drug Delivery, and OpenNano, Co-Editor of Current Pharmaceutical Biotechnology and on the Editorial Boards of many other journals. He received more than $30 M from the governmental and industrial sources in research funding. He has multiple honors and awards and in 2011, Times Higher Education ranked him number 2 among the top world scientists in pharmacology for the period of 2000-2010.

Close

Ernst Wagner
Department of Pharmacy, and Center for Nanoscience (CeNS)
Ludwig-Maximilians-Universität (LMU)
Munich
(Germany)
Biography

×

Biography of Ernst Wagner

Dr. Wagner is Professor of Pharmaceutical Biotechnology at Ludwig-Maximilians-Universität Munich and a member of the Munich Center for Nanoscience. He coordinates 'Biomedical Nanotechnologies' of the Excellence Cluster 'Nanosystems Initiative Munich'. After a Ph.D. in Chemistry from the Technical University of Vienna and a postdoctoral stay at the ETH Zurich, he was the group leader at the IMP Vienna and Director for Cancer Vaccines at Boehringer Ingelheim Austria. Dr. Wagner has authored more than 390 publications with an h-index 70. He has been a board member of the German Society for Gene Therapy, Committee member of ASGCT, and BSA member of the CRS.

Close

Roderick Bryan Walker
Division of Pharmaceutics
Rhodes University
Grahamstown
(South Africa)
Biography

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Biography of Roderick Bryan Walker

Professor Walker completed his Ph.D. degree in Biopharmaceutics and Pharmacokinetics at Rhodes University in Grahamstown, South Africa. He is the former Dean and Head of the Faculty of Pharmacy at Rhodes and is currently the Professor of Pharmaceutics and is the current chair of the Academy of Pharmaceutical Sciences in South Africa. Professor Walker has published and presented over 200 scientific outputs and serves on the editorial boards of a number of journals. Professor Walker undertakes research studies in all aspects of drug delivery and product development.

Close

Zimei Wu
School of Pharmacy
University of Auckland
Auckland
(New Zealand)
Biography

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Biography of Zimei Wu

Zimei Wu is an Associate Professor at the School of Pharmacy, University of Auckland, New Zealand (NZ). She holds a PhD from University of Otago (NZ) and a Masters from China Pharmaceutical University. Her 'liposomes' research has attracted wide collaborations. She received an NZ-China Scientist Exchange

Award from the Royal Society of NZ. She also researches transdermal delivery with successful stories featured on NZ TV3. Zimei also serves on editorial boards of Journal of Liposome Research, and Pharmaceutical Development and Technology and a referee for >20 journals. Zimei was the past President of NZ Local Chapter of Controlled Release Society.

Close

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MLN Medical College Prayagraj
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Biography of Sarita K. Yadav

Dr. Sarita K Yadav obtained her B. Pharm from DIPSAR and earned her M. Pharm and Ph.D. from IIT(BHU), India. Currently, she is working as Assistant Professor at MLN Medical College, Prayagraj. She has qualified GATE 2009 with AIR-32. She had worked for two years as drug analyst in testing of drugs and cosmetics products at UPFSDA, Lucknow. She had received “Young Scientist Award-WF” in 2015 by SPER for her research contributions. She holds lifetime membership of APTI, IPGA, SPER, and PRISAL. She is a member of editorial board of Micro and Nano System (MNS) by Bentham Science, IJBST journal group and peer reviewer in Future Journal of Pharmaceutical Sciences, Saudi Pharmaceutical Journal etc. Currently, she has many research/reviews papers to her credit in high impact journals with total impact factor around 60.

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(China)
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Biography of Yanjun Zhao

Prof. Zhao is a Full Professor of Pharmaceutics in the School of Pharmaceutical Science and Technology, Health Science Platform, Tianjin University. He obtained the Bachelor (Polymer), Master (Engineering), and PhD (Pharmacy) degree from Dalian University of Technology, Dalian Institute of Chemical Physics (CAS), and King's College London, respectively. His research interests focus on pharmaceutical micelles, stimuli-responsive drug delivery, and ferroptosis antitumor nanomedicine.

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Oxford, MS
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Biography of Goutam Mondal

Dr. Goutam Mondal is an emerging pharmaceutics and drug delivery scientist. He is an expert in the design and synthesis of receptor targeted lipids and polymeric systems, the techniques of animal tissue culture, tumor growth inhibition studies, and pharmacokinetics studies of small molecules. Presently, he is associated with Dr. Ikhlas A Khan's research group under supervision of Dr. Ryan Yates at the National Center for Natural Products Research, University of Mississippi, USA where he is actively involved in pre-clinical and clinical pharmacokinetics and pharmacodynamics of natural products. He has published 21 research articles in high impact peer-reviewed journals.

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Mariane L. Nogueira
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Biography of Mariane L. Nogueira

Dr. Mariane Lira Nogueira is a Pharmacist. She obtained Master's degree in Pharmaceutical Sciences, and Ph.D. in Biological Sciences with an emphasis on Biotechnology. She completed an interuniversity exchange doctorate in Pharmacotechnics (2007-2008) at the Faculté de Pharmacie - Université Paris Sud 11 and an internship at the Universidad de Navarra (2008). She did Post-doc from the Université Paris Saclay (2014-2015). She is currently an Associate Professor at the Federal University of Pernambuco, Brazil, a researcher at the Keizo-Asami Immunopathology Laboratory, and leader of Nanotechnology, Biotechnology, and Cell Culture Research Group. Her research fields are mainly focused on the development and characterization of surface-modified nanocarriers for biomedical applications.

Close

Meysam Omidi
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Biography

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Biography of Meysam Omidi

Dr. Meisam Omidi is an Assistant Professor of Protein Research Center, Shahid Beheshti University. Dr. Omari's research is focused on application of nanobiomaterials in soft, hard, and interfacial tissue engineering. He is particularly interested to design and fabricate smart nano drug delivery systems for regenerative medicine application. He has (co)authored over 80 research papers in the field of nanoscience and nanotechnology.

Close

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Biography

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Biography of Aniruddha Roy

Dr. Aniruddha Roy is currently working as an Assistant Professor in the Department of Pharmacy at Birla Institute of Technology and Science (BITS) - Pilani, India. He is a Pharmaceutical Technologist by training. He completed PhD in Immunology from National Institute of Immunology (NII), New Delhi, India. His main area of PhD thesis work

was immunotherapy of cancer. After PhD, he worked at the Indian Institute of Technology, New Delhi, Ontario Institute for Cancer Research at the University of Toronto, Canada, and University of British Columbia, Canada in various capacities. He has more than ten years of research experience. His research is primarily focused on nanomedicine and targeted drug delivery in different diseases.

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Executive Guest Editor(s)

Ismail Ocsoy
Department of Analytical Chemistry
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Biography

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Biography of Ismail Ocsoy

Dr. Ismail Ocsoy is a Professor in the faculty of Pharmacy, Erciyes University, Kayseri, Turkey. He completed his MS and Ph.D. in Chemistry from the Department of Chemistry, University of Florida, USA. His research focuses on Nano biotechnology consisting of DNA Aptamer conjugated nanomaterial, cancer therapy models, anti-cancer, antimicrobial agents and Nano bio-sensor for detection of antibiotic resistant bacteria. He has published more than 70 papers in highly reputable and prestigious journals.

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Related Journals

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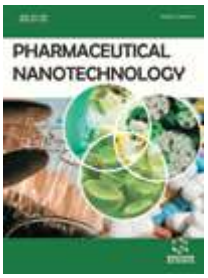
Pharmaceutical Nanotechnology

ISSN 2211-7385 (Print)



Pharmaceutical Nanotechnology publishes original manuscripts, reviews, thematic issues, rapid technical notes and commentaries that provide insights into the synthesis, characterisation and pharmaceutical (or diagnostic) application of materials at the nanoscale. The nanoscale is defined as a size range of below 1 μm. Scientific findings related to micro and macro systems with functionality residing within features defined at the nanoscale are also within the scope of the journal. Manuscripts detailing the synthesis, exhaustive characterisation, biological evaluation, clinical testing and/ or toxicological assessment of nanomaterials are of particular interest to the journal's readership. Articles should be self contained, centred around a well founded hypothesis and should aim to showcase the pharmaceutical/ diagnostic implications of the nanotechnology approach. Manuscripts should aim, wherever possible, to demonstrate the in vivo impact of any nanotechnological intervention. As reducing a material to the nanoscale is capable of fundamentally altering the material's properties, the journal's readership is particularly interested in new characterisation techniques and the advanced properties that originate from this size reduction. Both bottom up and top down approaches to the realisation of nanomaterials lie within the scope of the journal.

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RESEARCH ARTICLE

Antiviral Action of Curcumin Encapsulated in Nanoemulsion against Four Serotypes of Dengue Virus

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Abstract: ***Background*:** Curcumin has been used as a traditional medicine showing anti-inflammatory, antimicrobial, and antiviral properties. Despite the promising potentials, curcumin-based drug development is hindered due to its poor solubility and cell uptake.

***Objective*:** This study aims to produce curcumin nanoemulsion (nanocurcumin) and evaluate its physical characteristics and *in vitro* cell cytotoxicity and antiviral activity against dengue virus (DENV).

***Methods*:** Nanocurcumin was generated by self-nanoemulsion technique. Cytotoxicity was determined using MTT assay in A549 cell line. Anti-DENV properties were determined by calculation of inhibitory concentration 50 (IC_{50}) and plaque assay.

***Results*:** The resulting nanoemulsion showed uniform droplet size distribution with the average droplet size of 40.85 ± 0.919 nm. Nanocurcumin exhibited higher cell cytotoxicity compared to curcumin solution and may be explained by better cell uptake. Nanocurcumin treatment suppressed DENV growth, although no significant difference observed compared to the curcumin solution counterpart. Greater virus reduction was observed for DENV-1 and DENV-2.

***Conclusion*:** The synthesis of nanocurcumin improved curcumin physicochemical properties with potential as antiviral against DENV.

ARTICLE HISTORY

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1. INTRODUCTION

Dengue virus (DENV) is a positive-sense single-stranded RNA virus, a member of the *Flaviviridae* family, the causative agent of dengue disease. The virus is transmitted between human individuals through *Aedes* mosquitoes' bites. DENV can be differentiated into four different serotypes (DENV-1, DENV-2, DENV-3, and DENV-4) [1]. The global burden of dengue is estimated to reach up to 390 million infections occurring annually with Asian countries suffering

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from most of the burden [2]. As a dengue endemic country, Indonesia displays an increasing trend of dengue incidence rate from 1968 to 2013 [3]. DENV infection can manifest into various clinical symptoms, ranging from the classical dengue fever (DF) to the more severe forms of dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS) [1, 4].

Although DENV infection often causes severe disease and fatality, currently there is no antiviral available for this disease. Efforts to discover drugs for this disease are sought, including the use of natural products as the potential source of antivirals [5]. Curcumin [1,7-bis (4-hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5-dione] is one of the main substances found in the rhizome of *Curcuma longa* (L) and other *Curcuma* spp. [6]. This substance has been commonly used as a traditional medicine worldwide, including Indonesia. Curcumin has been reported to have strong antimicrobial, antiviral, and anti-inflammatory properties [7]. Several studies have reported the antiviral property of curcumin to Hepatitis C Virus (HCV) [8], Vesicular Stomatitis Virus (VSV), Herpes Simplex Virus (HSV) 1 and 2 [9], para-influenza 3, and Respiratory Enteric Orphan Virus (REO) 1 [10].

Antiviral activities of curcumin against DENV-2 has also been reported [11, 12]. The action against DENV or enveloped virus is believed through the inhibition of the Ubiquitin Proteasome System (UPS) [11, 13], which plays a role in viral replication [14]. Nevertheless, the development of curcumin as an antiviral drug is still hindered by its poor solubility and rapid hydrolysis in aqueous media, which leads to low bioavailability in the serum and tissue after administration [15]. Numerous approaches have been undertaken to solve, including the formation of nanoemulsion or nanocurcumin. It has been demonstrated that curcumin encapsulated in the nanocarrier system exhibited an increase in physicochemical stability and therefore its shelf-life [16]. In this report, we describe the potential antiviral activity of curcumin nanoemulsion against four Indonesian-derived DENV serotypes.

2. MATERIALS AND METHODS

2.1. Materials

The human alveolar epithelial cell line A549 (CCL-185) and baby hamster kidney BHK-21 (CCL-10) cells were from the culture collection at Eijkman Institute for Molecular Biology and maintained in RPMI medium supplemented with 10% fetal bovine serum (FBS) and 1% of Antibiotic-Antimycotic (all from Gibco-Thermo Scientific) in a humidified 37°C incubator with 5% CO_2 supplementation. Four DENV strains representing four DENV serotypes from Indonesia were isolated from clinical isolates and propagated in Vero (CCL-81) cells and maintained in low passage number to minimize mutation accumulation. The DENV-1 JMB-034 was isolated from a dengue patient in Jambi [17] while the other three strains, *i.e* DENV-2 SUB-011, DENV-3 SUB-006, and DENV-4 SUB-007 were isolated from patients in Surabaya, East Java [18, 19]. Curcumin powder (98.2% purity) obtained from Combiphar, Indonesia. Castor oil, Cremophor RH 40, and PEG 400 were obtained from idCHEM, Korea. Dimethyl sulfoxide (DMSO) was obtained from Applichem, Indonesia.

2.2. Curcumin-loaded Nanoemulsion

Curcumin was loaded in the nanoemulsion system including castor oil, Cremophor RH 40, and PEG 400, as previously described [16]. Briefly, castor oil (oil phase), Cremophor RH40 (surfactant), and PEG 400 (co-surfactant) were mixed with the ratio of 1:8:1 using a magnetic stirrer at 100 *rpm* for 2 hours to form the homogenous oil phase. Further, the oil phase was placed in a sonicator bath (Branson 5510) for 1 hour at 25°C to complete the SNE process. Subsequently, the product was added to deionized water with a concentration of 2 mg/mL and stirred for 15 minutes at 100 *rpm* until a clear and homogenous system was formed. As a comparison, a curcumin solution was prepared in DMSO.

2.3. Evaluation and Characterization of Curcumin-loaded Nanoemulsion

The particle size as well as the size distribution of the nanoemulsion were characterized using DelsaNano C Particle Analyzer (Beckman Coulter)

which was measured based on the photon correlation spectroscopy. Cryo-transmission electron microscopy (cryo-TEM) was employed to analyse the morphology of nanocurcumin. Briefly, 10 µL of nanocurcumin was dropped on a 400 mesh cryo-TEM grid and allowed to dry for 1 minute before being stained with 10 µl of uranyl acetate. The grid was allowed to dry and placeinto the JEOL 1010 cryo-TEM instrument at Eijkman Institute for Molecular Biology to inspect the nanocurcumin morphology under 80 kV at 20,000 × magnification.

Encapsulation efficiency was determined by calculating the ratio between the amount of curcumin entrapped and the initial amount of curcumin in nanoemulsion, and drug loading were determined by calculating the ratio between amount of curcumin entrapped and volume of nanoemulsion. 1 mL of the curcumin nanoemulsion was centrifuged at 14000 rpm for 15 minutes and the supernatant was diluted in DMSO. The percentage of curcumin encapsulated was measured using UV/Vis spectrophotometer (Beckman DU 7500i) at the wavelength of 430 nm based on the standard calibration of curcumin in DMSO provided.

$$\% \text{ Encapsulation Efficiency} = \frac{\text{Amount of curcumin entrapped}}{\text{Initial amount of curcumin in nanoemulsion}} \times 100\%$$

$$\text{Drug Loading} = \frac{\text{Amount of curcumin entrapped}}{\text{Volume of nanoemulsion}}$$

2.4. Cell Viability Assay

The cytotoxicity of nanocurcumin was assessed using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (MTT) in Vybrant MTT Cell Proliferation kit (Thermo-Scientific). Briefly, A549 cells were seeded into wells of 96-well plate (Corning) with a density of 10^5 cells/well. Confluent cells were treated with nanocurcumin or curcumin solution using a 2-fold serial dilution, ranging from 1 to 100 µg/mL, performed in triplicates. Vehicle controls were prepared as 1% v/v of nanoemulsion vehicle or DMSO in a medium. Further, the cells were incubated at 37°C incubator, 5% CO_2 for 48 hours. Following the incubation period, the supernatant was removed from each well and replenished with 100 µL of fresh medium followed by the addition of 10 µL of 12 mM MTT solution. The formation of formazan was allowed for 2 hours at 37°C, 5% CO_2 where blue colour was developed. The reaction was continued with the addition of 100 µL of sodium dodecyl sulphate-hydrochloric acid (SDS-HCl) and further incubation for 18 hours. Subsequently, the sample absorbance was determined by UV-Vis spectrophotometry at 570 nm. A dose-response curve was obtained using non-linear regression (curve fit) and the cytotoxic concentration was calculated to determine the concentration required to reduce the cell viability by 50% (CC_{50}).

2.5. Antiviral Activity Value Determination

The anti-DENV activity of nanocurcumin against DENV-1 to -4 was assessed by measuring the virus titre after exposure to different concentrations of nanocurcumin or curcumin solution, using standard plaque assay method [20, 21]. The A549 cells were seeded at 10^5 cells/well in 96-well plate and subjected to infection with DENV-1, DENV-2, DENV-3, or DENV-4 with multiplicity of infection (m.o.i) value of 1 (hypothetically one virus particle per cell). Treatment of cells with calculated concentrations of nanocurcumin or curcumin solution was done according to the three treatment methods. In the pre-entry treatment, known titre of DENV were mixed with known concentrations of nanocurcumin or curcumin solution followed by inoculation of the mixture into A549 cell monolayers for 1 hour at 37°C, 5% CO_2. Following the incubation period, inoculant was aspirated, and cells were washed with complete RPMI-10% FBS medium to remove unbound viruses before replenishment with fresh complete medium and incubation for 48 hours at 37°C, 5% CO_2. On the other hand, in the after-entry treatment, cells were initially inoculated with known titre of DENV and incubated for 1 hour at 37°C to facilitate virus-cell binding and adsorption. The cells were then washed with complete medium and replenished with medium containing known concentrations of nanocurcumin or curcumin solution and incubated for 48 hours. at 37°C, 5% CO_2. Meanwhile, in the full-treatment method, the mixture of DENV and nanocurcumin or curcumin solution was added to cell monolayer and without removal and wash steps, allowed to react at 37°C, 5% CO_2 for 48 hours. After incubation, the supernatant was trans-

ferred into microtubes for the virus titration using plaque assay in BHK21 cells. To assess the cell viability upon virus infection and curcumin treatment, MTT assay was performed as described above.

2.6. Statistical Analysis

Statistical analysis was performed using IBM SPSS software v.21. The parametric student's t-Test was used to compare the means between two independent groups. The *p*-value of < 0.05 was considered statistically significant.

3. RESULTS AND DISCUSSION

Curcumin is not yet claimed as a drug due to low soluble in water, light sensitive, and low bioavailability upon oral as well as vascular routes. The low bioavailability of curcumin is a combination of its low solubility, dissolution and absorption rates, and high hepatic metabolism [8]. Various methods have been carried out to improve the lack of curcumin as a drug, including the analogue synthesis, chemical pro-drug formation, combination with food components, and many others. Nanotechnology was known to provide a novel approach for pharmaceutic-associated problem drugs including curcumin [22, 23].

We successfully synthesized nearly monodisperse negatively charge curcumin nanoemulsion with the average droplet size of 40.85 ± 0.919 nm, 0.366 ± 0.165 for polidispersity index value and zeta potential of -7.039 ± 0.532 mV. The TEM analysis confirms the spherical morphology of nanoemulsion with uniform size (Fig. **1**). The negative charge of the nanoemulsion was caused by the use of Cremophor RH 40, a dissociated fatty acid ester with low toxicity and high biological compatibility [24], which can form negatively charged free fatty acids. A high amount of surfactant in the formula contributed to the droplet stabilization through droplet surface coverage. The % of encapsulation efficiency was 99.40% and the value of drug loading was 1.988 mg curcumin/mL nanoemulsion.

Curcumin is known to inhibit A549 cell proliferation by inducing apoptosis and there is a linear relationship between inhibitory effect and curcumin concentration [25, 26]. In this study, we compared the cytotoxicity and viral inhibitory characteristics of nanocurcumin to the DMSO-based curcumin solution counterpart. The CC_{50} value represents the concentration of an active substance that can induce a 50% reduction of the cell population. Treatment of different concentrations of nanocurcumin to the A549 human cell line generated a CC_{50} value of 52.97 μg/mL (Table **1**). On the other hand, treatment with DMSO-based curcumin solution generated a higher CC_{50} value (61.51 μg/mL). A significant decrease in cell viability was observed after treated with both nanocurcumin and curcumin solution at a concentration of 100 μg/mL (Fig. **2**). No significant impact was observed on cell viability treated with vehicle controls. A typical lower cell viability was observed in nanocurcumin-treated cells than in curcumin solution. Cell viability of higher than 80% was observed at treatments using concentrations below 12.5 μg/mL. Based on this observation, the concentration tested for an antiviral activity was 1, 5, and 10 μg/mL. The selection of A549 cells as an infected host was due to its suitability for DENV studies [20]. There was no significant change in viability when A549 cells were treated with both compounds up to 50 μg/mL (Fig. **2**). Higher toxicity of nanocurcumin on A549 cells compared to curcumin solution was possibly caused by the differences in the cellular uptake; nanoemulsion system presumably was more readily taken up to the cells due to the composition.

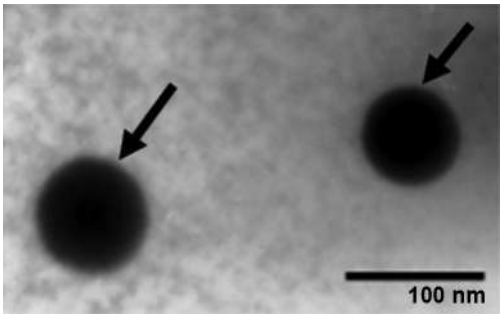

Fig. (1). The TEM analysis of curcumin nanoemulsion. Magnification of 20,000 ×. (*A higher resolution / colour version of this figure is available in the electronic copy of the article*).

The inhibitory effect of nanocurcumin against DENV was measured as a percent of viable virus titre in the supernatant of treated cells to the viral titre in control medium. From three different viral infection approaches (pre-entry, after-entry, and

Table 1. The *in vitro* characteristics of nanocurcumin and curcumin solution in A549 cell system as determined by cell cytotoxicity 50 (CC_{50}) and inhibitory concentration 50 (IC_{50}) values.

Parameters	Nanocurcumin	Curcumin Solution
Cell cytotoxicity/CC_{50} (μg/mL)	52.97	61.51
Inhibitory concentration/IC_{50} of challenge virus (μg/mL)	-	-
DENV-1	0.96	1.12
DENV-2	2.61	4.03
DENV-3	22.62	35.9
DENV-4	15.13	17.24

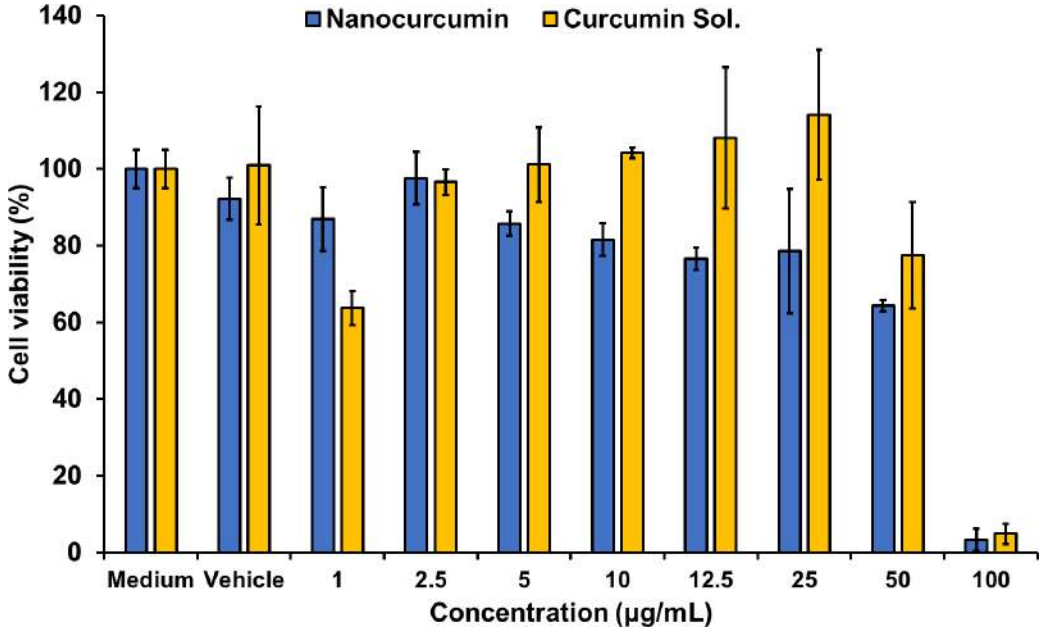

Fig. (2). A549 cell viability treated with different concentrations of nanocurcumin or curcumin solution. (*A higher resolution / colour version of this figure is available in the electronic copy of the article*).

full-treatment), we observed that the full-treatment method generated the most consistent viral inhibitory profile (data not shown). The full-treatment of nanocurcumin and curcumin solution to DENV-infected A549 cells showed a decrease in DENV titre after 48 hours of incubation along with the increase in compound concentration (Figs. **3-6**). The decrease in viral titre was observed in all four DENV serotypes with greater inhibitory profiles detected for DENV-1 (Fig. **3**) and DENV-2 (Fig. **4**). The MTT assay performed on infected A549 cells revealed cell viability of about 80%, although slightly lower cell viability was observed in DENV-4-infected cell system (Fig. **6**). There were no statistically significant differences between DENV titre treated with either nanocurcumin or curcumin solution.

We analysed cell viability from the challenge tests to ensure that cell death was related to the inhibitory effect of curcumin on the dengue virus and that the decrease of viral titre was not due to cell death. Overall, cell viability slightly dropped to not less than 80% after exposure to all dengue serotypes, with the exception in DENV-4 challenge test, which displays cell viability around 70% (Fig. **6**). The decrease in viral titres due to cell death can be regarded as inconsequential to the experiment.

The viral titre values after incubation with nanocurcumin and curcumin solution were calculated from plaque assay test results. The viral titre of all DENV serotypes decreased after treated with either nanocurcumin or corresponding solution

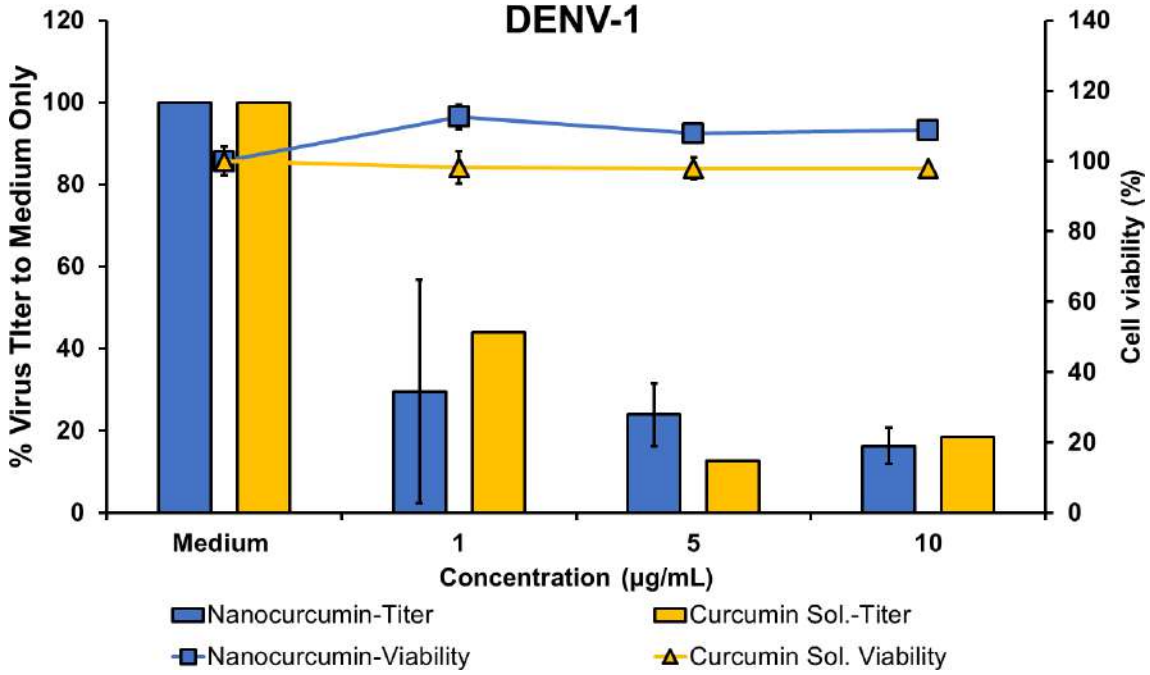

Fig. (3). Inhibitory effect of nanocurcumin and DMSO-based curcumin solution to the replication of DENV-1 (bars) and the corresponding A549 cell viability (lines) during challenge assay in a full-treatment approach. (*A higher resolution / colour version of this figure is available in the electronic copy of the article*).

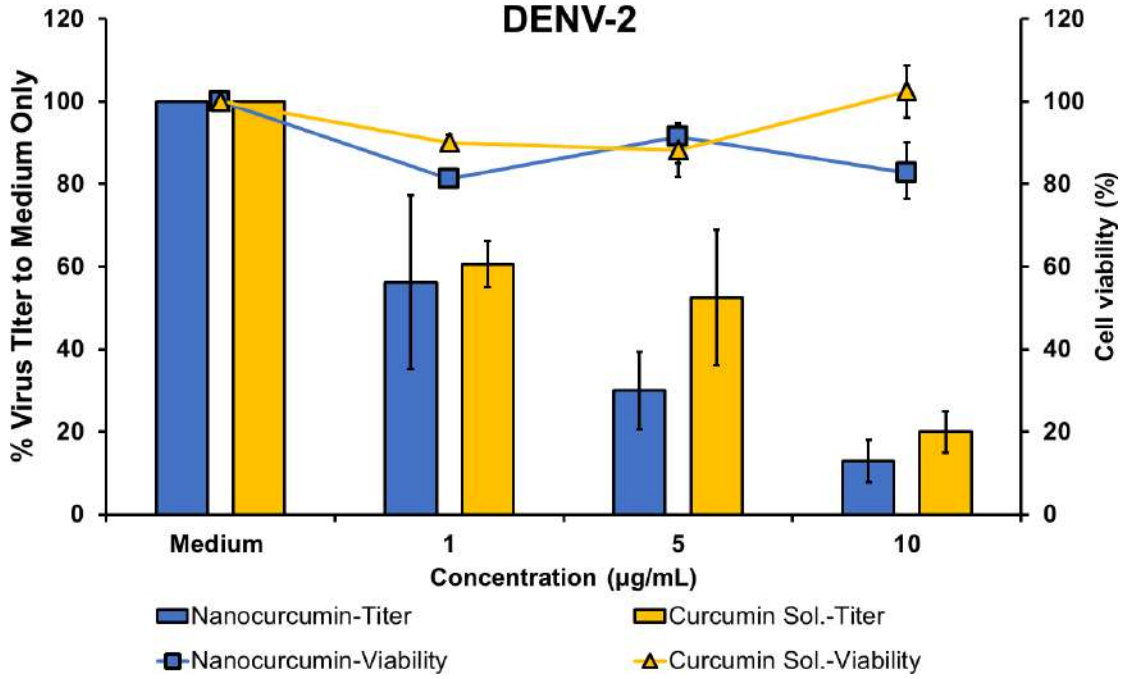

Fig. (4). Inhibitory effect of nanocurcumin and DMSO-based curcumin solution to the replication of DENV-2 (bars) and the corresponding A549 cell viability (lines) during challenge assay in a full-treatment approach. (*A higher resolution / colour version of this figure is available in the electronic copy of the article*).

(Figs. **3-6**). However, DENV-1 (Fig. **3**) and DENV-2 (Fig. **4**) gave a better response compared to both DENV-3 (Fig. **5**) and DENV-4 (Fig. **6**). These findings urge that antiviral activity testing against DENV should consider the use of all four serotypes and not only a representative serotype. Moreover, we used DENV strains isolated from patients that may be considered as wildtype viruses rather than the highly adapted prototype or laboratory strains of DENV that may have accumulated mutations through the time. Based on the data above, the curcumin-loaded in nanoemulsion

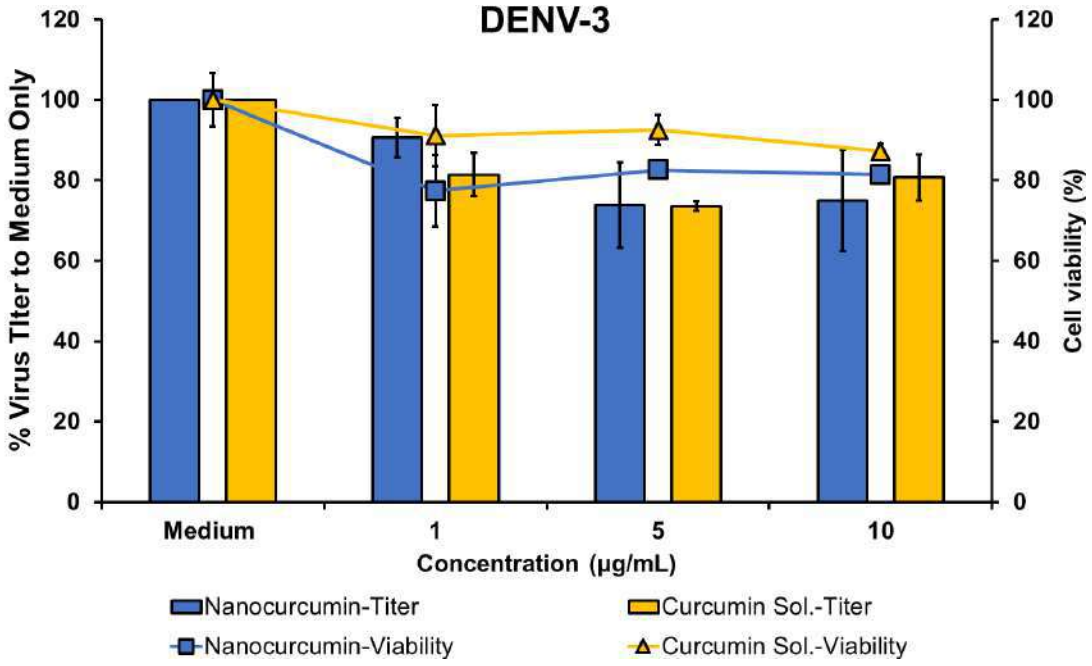

Fig. (5). Inhibitory effect of nanocurcumin and DMSO-based curcumin solution to the replication of DENV-3 (bars) and the corresponding A549 cell viability (lines) during challenge assay in a full-treatment approach. (*A higher resolution / colour version of this figure is available in the electronic copy of the article*).

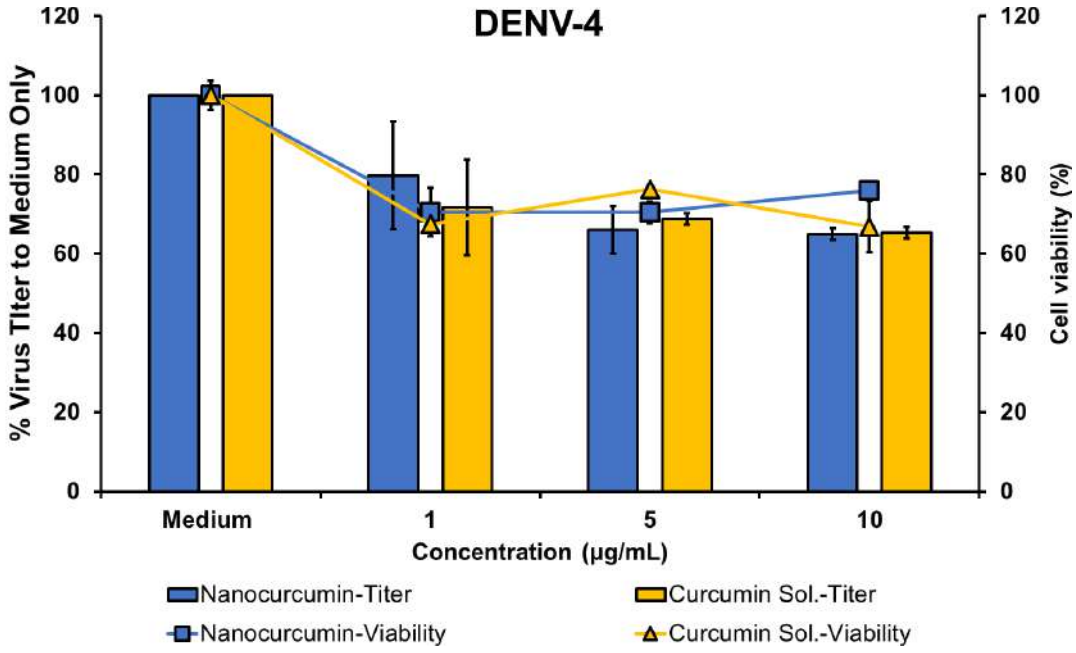

Fig. (6). Inhibitory effect of nanocurcumin and DMSO-based curcumin solution to the replication of DENV-4 (bars) and the corresponding A549 cell viability (lines) during challenge assay in a full-treatment approach. (*A higher resolution / colour version of this figure is available in the electronic copy of the article*).

improves the physicochemical properties of curcumin while keeping the potent inhibitory effect to four DENV serotypes. Curcumin in the nanoemulsion shows promising and safer formula as compared to DMSO-based curcumin solution hence replacing the formulation using DMSO, an uncommon solvent in the pharmaceutical products.

4. CURRENT & FUTURE DEVELOPMENTS

Curcumin has a promising potential as a therapeutic agent, especially as an antivirus. However, it is known that curcumin has poor cell uptake and also poor solubility in aqueous solution, therefore the bioavailability of curcumin is low. Based on several studies to solve the problem of curcumin,

the use of nanocarrier can exhibit an improvement in physicochemical stability. This result is also confirmed by our previous study. Our current study showed that curcumin nanoemulsion has a potential value as an antivirus against DENV. In the future, an accelerated stability test and antiviral test against DENV using a different method from Plaque Assay will be done to prove that curcumin nanoemulsion can improve the physicohemical properties and bioavailability of curcumin, and can be used as an anti-dengue drug for commercial purposes.

CONCLUSION

Curcumin loaded nanoemulsion consisted of castor oil, Cremophor RH40 and PEG 400, with the average droplet size of 40.85 ± 0.919, which increased the physical properties of curcumin while keeping the potent inhibitory effect to four DENV serotypes and hence replacing the solution formula, using a toxic organic solvent, which is DMSO.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The human alveolar epithelial cell line A549 (CCL-185) and baby hamster kidney BHK-21 (CCL-10) cells were from the culture collection at Eijkman Institute for Molecular Biology, Jakarta, Indonesia.

HUMAN AND ANIMAL RIGHTS

No Animals/Humans were used for studies that are base of this research.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author [HR] upon request.

FUNDING

This study was funded by the Indonesia Ministry of Research, Technology, and Higher Education, contract number: 127/SP2H/PTNBH/DRPM/2018.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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