



Review

Molecular Insights into Coumarin Analogues as Antimicrobial Agents: Recent Developments in Drug Discovery

Rameshwar S. Cheke ^{1,*}, Harun M. Patel ², Vaishali M. Patil ^{3,*}, Iqar Ahmad Ansari ², Jaya P. Ambhore ¹, Sachin D. Shinde ⁴, Adel Kadri ^{5,6}, Mejdi Snoussi ^{7,8}, Mohd Adnan ⁷, Prashant S. Kharkar ⁹, Visweswara Rao Pasupuleti ^{10,11,12,*} and Prashant K. Deshmukh ¹³

- ¹ Department of Pharmaceutical Chemistry, Dr. Rajendra Gode College of Pharmacy, Malkapur 443101, India; ambhorejp02@gmail.com
- ² Department of Pharmaceutical Chemistry, R. C. Patel Institute of Pharmaceutical Education and Research, Shirpur 425405, India; hpatel_38@yahoo.com (H.M.P.); ansariiqar50@gmail.com (I.A.A.)
- ³ Department of Pharmaceutical Chemistry, KIET School of Pharmacy, KIET Groups of Institutions, Delhi-NCR, Delhi 201206, India
- ⁴ Department of Pharmacology, Shri. R. D. Bhakt College of Pharmacy, Jalna 431213, India; sdshinde8390@gmail.com
- ⁵ Faculty of Science of Sfax, Department of Chemistry, University of Sfax, B.P. 1171, Sfax 3000, Tunisia; alkadeh@yahoo.fr
- ⁶ Department of Pharmaceutical Chemistry, Faculty of Science and Arts in Baljuraishi, Albaha University, P.O. Box 1988, Albaha 65527, Saudi Arabia
- ⁷ Department of Biology, College of Science, University of Hail, Hail P.O. Box 2440, Saudi Arabia; amnejda@yahoo.fr (M.S.); drmohdadnan@gmail.com (M.A.)
- ⁸ Laboratory of Genetics, Biodiversity and Valorization of Bio-Resources (LR11ES41), University of Monastir, Higher Institute of Biotechnology of Monastir, Avenue Tahar Haddad, BP74, Monastir 5000, Tunisia
- ⁹ Department of Pharmaceutical Sciences and Technology, Institute of Chemical Technology, Matunga, Mumbai 400019, India; ps.kharkar@ictmumbai.edu.in
- ¹⁰ Department of Biomedical Sciences and Therapeutics, Faculty of Medicine & Health Sciences, University Malaysia Sabah, Kota Kinabalu 4800, Malaysia
- ¹¹ Department of Biochemistry, Faculty of Medicine and Health Sciences, Abdurrab University, Pekanbaru 28291, Indonesia
- ¹² Centre for International Collaboration and Research, Reva University, Rukmini Knowledge Park, Kattigenahalli, Yelahanka, Bangalore, Karnataka 560064, India
- ¹³ Department of Pharmaceutics, Dr. Rajendra Gode College of pharmacy, Malkapur 443101, India; pkdesh@rediffmail.com
- * Correspondence: rameshcheke23@gmail.com (R.S.C.); vaishuwise@gmail.com (V.M.P.); prao@ums.edu.my (V.R.P.)



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Simple Summary: Coumarins are a large family of benzopyrones, and more than 1300 coumarins have been reported to date. Natural, as well as synthetic, coumarins have demonstrated a diverse activity spectrum. On the other hand, the demands of the current health scenario witnessing morbidity and mortality due to microbial infections and multidrug-resistant bacterial strains, the well-reported phytochemical coumarin can be of interest. Some of the well-reported coumarin analogues as antimicrobial agents include β -lactam derivatives, coumarin-based 1,2,3-triazole compounds, the miconazole analogue, coumarin-substituted pyrazole hybrids, pyranocoumarin, coumarin–sulphonamide hybrids, pyranocoumarins, coumarin–sulphonamide derivatives, chromenylpyrazoles candidates, 3-amidocoumarins analogues, uracil–coumarin hybrids, indolinedione–coumarin hybrids, coumarin–imidazole hybrids, coumarin-fused pyrazolones and methyl thiazole derivatives, coumarin–theophylline hybrids, etc. In the present review, several methods for the synthesis of coumarin derivatives as antimicrobial agents are reported, along with structure–activity relationship (SAR) studies focusing on the developments reported since 2016.

Abstract: A major global health risk has been witnessed with the development of drug-resistant bacteria and multidrug-resistant pathogens linked to significant mortality. Coumarins are heterocyclic compounds belonging to the benzophenone class enriched in different plants. Coumarins and their derivatives have a wide range of biological activity, including antibacterial, anticoagulant,

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Recent Research Developments in Antimicrobial Agents & Chemotherapy S. G. Pandalai, 1999 **Recent Research Developments in Antimicrobial Agents & Chemotherapy**, 1999 **Recent Research Developments in Antimicrobial Agents & Chemotherapy**, 1999 **Novel Antibacterial Agents** Fiorella Meneghetti, Daniela Barlocco, 2022-01-12 This book was devoted to the latest advances achieved in the antibacterial field with a focus on the recent efforts made to develop new antimicrobial agents with novel modes of action and a perspective on future directions of this line of research Antimicrobial resistance has become a major threat to global health and the twenty two published articles here reported put in evidence that the discovery and development of new antibiotics are extremely challenging The antimicrobial research covers a wide area spanning from the design of new compounds also supported by molecular modeling techniques their synthesis and characterization and biological tests In this context the current crisis caused by the COVID 19 pandemic but also older threats such as the human immunodeficiency virus or the hepatitis C virus require greater attention than ever The research works described in this book provide an extremely useful example of the results achieved in the field of antibacterial drug development The search for new chemical entities was approached starting from both natural and synthetic compounds and addressing different targets In addition recent findings were presented and discussed highlighting the strategies to fight bacterial resistance Detailed references to the state of the art can be found in this book We strongly encourage the wide group of readers to explore the book that we are presenting to get inspired to develop new approaches for the diagnosis and treatment of antibacterial diseases and to circumvent resistance issues **Recent Trends and The Future of Antimicrobial Agents - Part 2** Tilak Saha, 2023-06-27 Recent Trends and the Future of Antimicrobial Agents provides a significantly expanded overview of the topic with updated research in a broader context on the development of alternative approaches against microbial infections This part primarily describes the use of probiotics chemically synthesized compounds and nanomaterials as antimicrobial agents The first chapter describes the potential of probiotics for the restoration of gut microbiomes Amongst various antimicrobial agents the use of antibodies has recently been investigated as a potential remedy A chapter on antibody based therapy as an alternative to antibiotics has been included Chemical synthesis has eased the development of target based prospective drug molecules against microorganisms Chemically synthesized cationic amphiphiles and amphiphilic nanocarriers as antimicrobial agents have been discussed with sufficient detail in two different chapters Research and progress in Schiff Base Metal Complexes and Metal Organic Frameworks for their antimicrobial applications have also been described in two separate chapters Independent chapters discussing the design synthesis and antimicrobial applications of biogenic metal or metalloid nanoparticles bactericidal QDs and MoS₂ based antibacterial nanocomposites have fulfilled the aim of incorporating cutting edge research in the areas of alternative antimicrobials Also a new age approach to combat microbes antimicrobial photodynamic therapy aPDT is

discussed in the final chapter of the edited volume This part intends to provide the readers with an updated and broad view of research and development in alternative remedial approaches against microbial infections The contents cater to the information needs of professionals and learners in academia industry and health services who aim to learn the most significant experimental and practical approaches towards finding alternatives to existing antimicrobial therapies

Novel Antibacterial Agents Fiorella Meneghetti, Daniela Barlocco, 2022 This book was devoted to the latest advances achieved in the antibacterial field with a focus on the recent efforts made to develop new antimicrobial agents with novel modes of action and a perspective on future directions of this line of research Antimicrobial resistance has become a major threat to global health and the twenty two published articles here reported put in evidence that the discovery and development of new antibiotics are extremely challenging The antimicrobial research covers a wide area spanning from the design of new compounds also supported by molecular modeling techniques their synthesis and characterization and biological tests In this context the current crisis caused by the COVID 19 pandemic but also older threats such as the human immunodeficiency virus or the hepatitis C virus require greater attention than ever The research works described in this book provide an extremely useful example of the results achieved in the field of antibacterial drug development The search for new chemical entities was approached starting from both natural and synthetic compounds and addressing different targets In addition recent findings were presented and discussed highlighting the strategies to fight bacterial resistance Detailed references to the state of the art can be found in this book We strongly encourage the wide group of readers to explore the book that we are presenting to get inspired to develop new approaches for the diagnosis and treatment of antibacterial diseases and to circumvent resistance issues

Development of Novel Antimicrobial Agents Karl Lohner, 2001-01-01 This book presents current research on the development of new classes of antibiotics with novel mechanisms of action Leading international researchers from academia and industry present this unique collection of highly acclaimed reviews covering every aspect of this important topic The authors also discuss strategies for the containment of antimicrobial resistance and advocate a more sophisticated and prudent use of antibiotics

New Antimicrobial Agents and the Development of Resistance John baptist Maluda, Institute for Medical Research (Malaysia), 1994

Discovery of New Antimicrobial Agents William I. Northern, 2007 Combinatorial chemistry has become an important aspect of medicinal research due to its flexibility and the ability to produce large numbers of potential therapeutic agents Once compounds are made they must be screened to determine if there is any biological activity This research project focused on developing a screening method for chemical agents produced by a graduate student in the chemistry department at Wright State University After an acceptable screening method was found the goal of the project was to determine if compounds produced had either antibacterial activity antifungal activity or both Seven compounds exhibited biological activity Two of these compounds had activity against all organisms tested Five compounds had activity against only Staphylococcus aureus Also initial toxicity studies were performed on the

two compounds that had activity against both bacteria and fungi The toxicity was detected by cytopathic effect CPE noted in human and monkey cell lines One compound demonstrated severe toxicity while the other compound demonstrated slight toxicity Additional research including animal safety studies will be required to determine if these compounds are viable prospects for development into antimicrobial agents This research confirmed that it is possible to use combinatorial methods to produce agents However the ability to produce antimicrobial compounds is only a small part of producing a useful drug

Antimicrobials Flavia Marinelli, Olga Genilloud, 2013-10-04 Reports on the emergence and prevalence of resistant bacterial infections in hospitals and communities raise concerns that we may soon no longer be able to rely on antibiotics as a way to control infectious diseases Effective medical care would require the constant introduction of novel antibiotics to keep up in the arms race with resistant pathogens This book closely examines the latest developments in the field of antibacterial research and development It starts with an overview of the growing prevalence of resistant Gram positive and Gram negative pathogens including their various resistance mechanisms prevalence risk factors and therapeutic options The focus then shifts to a comprehensive description of all major chemical classes with antibacterial properties their chemistry mode of action and the generation of analogs information that provides the basis for the design of improved molecules to defeat microbial infections and combat the emerging resistances In closing recently developed compounds already in clinical use those in preclinical or first clinical studies and a number of promising targets to be exploited in the discovery stage are discussed

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