



Contents lists available at ScienceDirect

Bioorganic & Medicinal Chemistry

journal homepage: www.elsevier.com/locate/bmc



Bioorganic & Medicinal Chemistry Reviews and Perspectives

Editor-in-Chief

Professor Chi-Huey Wong

Department of Chemistry, BCC 338
The Scripps Research Institute
10550 North Torrey Pines Road
La Jolla, CA 92037, USA

Bioorganic & Medicinal Chemistry Reviews are specially-commissioned critical reviews of topical importance; *Perspectives* are brief reviews of specific subjects that have or are likely to have major impact in areas related to drug discovery or chemical biology. Such articles are commissioned in appropriate fields. Authors wishing to submit a nonsolicited review or perspective are requested to first contact the Editor-in-Chief.

1. The Enzymes Involved in Biosynthesis of Penicillin and Cephalosporin: Their Structure and Function, Cooper, R. D. G. *Bioorg. Med. Chem.* **1993**, 1, 1.
2. Toward the Mechanism of Phosphoinositide-Specific Phospholipases C, Bruzik, K. S.; Tsai, M. D. *Bioorg. Med. Chem.* **1994**, 2, 49.
3. Carbohydrate-Dependent Cell Adhesion, Fukuda, M. *Bioorg. Med. Chem.* **1995**, 3, 207.
4. Antithrombotic Agents: From RGD to Peptide Mimetics, Ojima, I.; Chakravarty, S.; Dong, Q. *Bioorg. Med. Chem.* **1995**, 3, 337.
5. Thrombin Active Site Inhibitors, Das, J.; Kimball, S. D. *Bioorg. Med. Chem.* **1995**, 3, 999.
6. Cycloaddition and Related Reactions of Cephalosporin Antibiotics, Pitlik, J. *Bioorg. Med. Chem.* **1995**, 3, 1157.
7. Asparagine-Linked Glycosylation: Specificity and Function of Oligosaccharyl Transferase, Imperiali, B.; Hendrickson, T. L. *Bioorg. Med. Chem.* **1995**, 3, 1565.
8. Peptide Nucleic Acids (PNA): Synthesis, Properties and Potential Applications, Hyrup, B.; Nielsen, P. E. *Bioorg. Med. Chem.* **1996**, 4, 5.
9. Progress Towards Understanding Sheet Structure, Nesloney, C. L.; Kelly, J. W. *Bioorg. Med. Chem.* **1996**, 4, 739.
10. Biological Applications of Fullerenes, Jensen, A. W.; Wilson, S. R.; Schuster, D. I. *Bioorg. Med. Chem.* **1996**, 4, 767.
11. Use of the Chemical Structure of Peptides as the Starting Point to Design Nonpeptide Agonists and Antagonists at Peptide Receptors: Examples with Cholecystokinin and Tachykinins, Horwell, D. C. *Bioorg. Med. Chem.* **1996**, 4, 1573.
12. Anti-DNA Autoantibodies: The Other DNA-binding Proteins, Bill, R. M.; Blatt, N. B.; Glick, G. D. *Bioorg. Med. Chem.* **1997**, 5, 467.
13. Combinatorial Chemistry in Drug Research from a New Vantage Point, Maehr, H. *Bioorg. Med. Chem.* **1997**, 5, 473.
14. Inhibition of the Ser-Thr Phosphatases PP1 and PP2A by Naturally Occurring Toxins, Sheppeck, J. E.; II, Gauss, C. M.; Chamberlin, A. R. *Bioorg. Med. Chem.* **1997**, 5, 1739.
15. Chemical Engineering of RNase Resistant and Catalytically Active Hammerhead Ribozymes, Burlina, F.; Favre, A.; Fourrey, J.-L. *Bioorg. Med. Chem.* **1997**, 5, 1999.
16. Adenosine Receptors: New Opportunities for Future Drugs, Poulsen, S.-A.; Quinn, R. J. *Bioorg. Med. Chem.* **1998**, 6, 619.
17. Peptide Conjugates as Tools for the Study of Biological Signal Transduction, Eisele, F.; Owen, D. J.; Waldmann, H. *Bioorg. Med. Chem.* **1999**, 7, 193.
18. Conformational Aspects of Inhibitor Design: Enzyme-Substrate Interactions in the Transition State, Wolfenden, R. *Bioorg. Med. Chem.* **1999**, 7, 647.
19. Bioorganic Chemistry of Cyclic ADP-ribose (cADPR), Zhang, F.-J.; Gu, Q.-M.; Sih, C. J. *Bioorg. Med. Chem.* **1999**, 7, 653.
20. Polyamino Acids as Catalysts in Asymmetric Synthesis, Porter, M. J.; Roberts, S. M.; Skidmore, J. **1999**, 7, 2145.
21. Non-Conventional Hydrolase Chemistry: Amide and Carbamate Bond Formation Catalyzed by Lipases, Gotor, V. *Bioorg. Med. Chem.* **1999**, 7, 2189.
22. Corticotrophin Releasing Hormone: Therapeutic Implications and Medicinal Chemistry Developments, Keller, P. A. *Bioorg. Med. Chem.* **2000**, 8, 1213.
23. Bacterial Diaminopimelate Metabolism as a Target for Antibiotic Design, Vederas, J. C. *Bioorg. Med. Chem.* **2000**, 8, 843.
24. Chemistry and Clinical Biology of the Bryostatins, Mutter, R.; Wills, M. *Bioorg. Med. Chem.* **2000**, 8, 1841.
25. Cytokine Receptor Dimerization and Activation: Prospects for Small Molecule Agonists, Boger, D. L.; Goldberg, J. *Bioorg. Med. Chem.* **2001**, 9, 557.
26. Apoptosis: Current Concepts and Future Directions, Blatt, N. B.; Glick, G. D. *Bioorg. Med. Chem.* **2001**, 9, 1371.
27. Carbohydrate Mimetics-Based Glycosyltransferase Inhibitors, Compain, P.; Martin, O. R. *Bioorg. Med. Chem.* **2001**, 9, 3077.
28. Structural Development of Biological Response Modifiers Based on Thalidomide, Hashimoto, Y. *Bioorg. Med. Chem.* **2002**, 10, 461.

29. Chemical Approaches to the Investigation of Cellular Systems, Cook, B. N.; Bertozzi, C. R. *Bioorg. Med. Chem.* **2002**, *10*, 829.
30. DNA Analogues: From Supramolecular Principles to Biological Properties, Leumann, C. J.; *Bioorg. Med. Chem.* **2002**, *10*, 841.
31. Histidine Kinases as Targets for New Antimicrobial Agents, Matsushita, M.; Janda, K. D. *Bioorg. Med. Chem.* **2002**, *10*, 855.
32. The Recent Impact of Solid-phase Synthesis on Medicinally Relevant Benzoannulated Nitrogen Heterocycles, Bräse, S.; Gil, C.; Knepper, K. *Bioorg. Med. Chem.* **2002**, *10*, 2415.
33. Synthesis of Tumor-Associated Glycopeptide Antigens, Brocke, C.; Kunz, H. *Bioorg. Med. Chem.* **2002**, *10*, 3085.
34. 5-Substituted-1H-tetrazoles as Carboxylic Acid Isosteres: Medicinal Chemistry of Synthetic Methods, Herr, R. J. *Bioorg. Med. Chem.* **2002**, *10*, 3379.
35. Enoyl-CoA Hydratase: Reaction, Mechanism, and Inhibition, Agnihotri, G.; Liu, H. *Bioorg. Med. Chem.* **2003**, *11*, 9.
36. Going Gently Into Flight: Analyzing Noncovalent Interactions by Mass Spectrometry (Perspective), Ganem, B.; Henion, J. D. *Bioorg. Med. Chem.* **2003**, *11*, 311.
37. Prodrugs of Biologically Active Phosphate Esters, Schultz, C. *Bioorg. Med. Chem.* **2003**, *11*, 885.
38. Solution-Phase Synthesis of Combinatorial Libraries Designed to Modulate Protein-Protein or Protein-DNA Interactions (Perspective), Boger, D. L. *Bioorg. Med. Chem.* **2003**, *11*, 1607.
39. Designing Anticancer Drugs Via the Achilles Heel: Ceramide, Allylic Ketones, and Mitochondria, Radin, N. S. *Bioorg. Med. Chem.* **2003**, *11*, 2123.
40. Recent Progress in Discovery of Small-Molecule CCRs Chemokine Receptor Ligands as HIV-1 Inhibitors, Kazmierski, W.; Bifulco, N.; Yang, H.; Boone, L.; DeAnda, F.; Watson, C.; Kenakin, T. *Bioorg. Med. Chem.* **2003**, *11*, 2663.
41. At the Crossroads of Chemistry and Biology (Perspective), Waldmann, H. *Bioorg. Med. Chem.* **2003**, *11*, 3045.
42. Architectural Self-Construction in Nature and Chemical Synthesis (Perspective), Sorensen, E. J. *Bioorg. Med. Chem.* **2003**, *11*, 3225.
43. Natural Product Glycorandomization (Perspective), Yang, J.; Hoffmeister, D.; Liu, L.; Fu, X.; Thorson, J. S. *Bioorg. Med. Chem.* **2004**, *12*, 1577.
44. Camptothecin: Current Perspectives, Thomas, C. J.; Rahier, N. J.; Hecht, S. M. *Bioorg. Med. Chem.* **2004**, *12*, 1585.
45. Enzymes in the Synthesis of Bioactive Compounds: the Prodigious Decades, García-Junceda, E.; García-García, J. F.; Bastida, A.; Fernández-Mayoralas, A. *Bioorg. Med. Chem.* **2004**, *12*, 1817.
46. Cocaine Pharmacology and Current Pharmacotherapies for its Abuse, Carrera, M. R. A.; Meijler, M. M.; Janda, K. D. *Bioorg. Med. Chem.* **2004**, *12*, 5019.
47. Catalytic Antibodies: Hapten Design Strategies and Screening Methods, Xu, Y.; Yamamoto, N.; Janda, K. D. *Bioorg. Med. Chem.* **2004**, *12*, 5247.
48. Sphingolipids as Conenzymes in Anion Transfer and Tumor Death (Perspective), Radin, N. S. *Bioorg. Med. Chem.* **2004**, *12*, 6029.
49. Corticosteroids: The Mainstay in Asthma Therapy, Gupta, R.; Jindal, D. P.; Kumar, G. *Bioorg. Med. Chem.* **2004**, *12*, 6331.
50. β -Peptides as Inhibitors of Protein-Protein Interactions (Perspective), Kritzer, J. A.; Stephens, O. M.; Guarracino, D. A.; Reznik, S. K.; Schepartz, A. *Bioorg. Med. Chem.* **2005**, *13*, 11.
51. Natural and Synthetic Cage Compounds Incorporating the 2,9,10-trioxatricyclo[4.3.1.0^{3,8}] Decane Type Moiety, Stanoeva, E.; He, W.; De Kimpe, N. *Bioorg. Med. Chem.* **2005**, *13*, 17.
52. N-Acyl-N-Alkyl-Sulfonamide Anchors Derived from Kenner's Safety-Catch Linker: Powerful Tools in Bioorganic and Medicinal Chemistry, Heidler, P.; Link, A. *Bioorg. Med. Chem.* **2005**, *13*, 585.
53. Chemical-Biological Interactions in Human, Verma, R. P.; Kurup, A.; Mekapati, S. B.; Hansch, C. *Bioorg. Med. Chem.* **2005**, *13*, 933.
54. Altering Protein Specificity: Techniques and Applications, Antikainen, N. M.; Martin, S. F. *Bioorg. Med. Chem.* **2005**, *13*, 2701.
55. An Approach Toward the Problem of Outliers in QSAR, Verma, R. P.; Hansch, C. *Bioorg. Med. Chem.* **2005**, *13*, 4597.
56. Ginkgolides and Bilobalide: Their Physical, Chromatographic and Spectroscopic Properties, van Beek, T. A. *Bioorg. Med. Chem.* **2005**, *13*, 5001.
57. Protein Oligomerization: How and Why, Ali, M. H.; Imperiali, B. *Bioorg. Med. Chem.* **2005**, *13*, 5013.
58. The Chemistry and Biology of Mucin-Type O-Linked Glycosylation, Hang, H. C.; Bertozzi, C. R. *Bioorg. Med. Chem.* **2005**, *13*, 5021.
59. New Reagents for Phosphatidylserine Recognition and Detection of Apoptosis, Hanshaw, R. G.; Smith, B. D. *Bioorg. Med. Chem.* **2005**, *13*, 5035.
60. Recent Advances in Tumor-Targeting Anticancer Drug Conjugates, Jaracz, S.; Chen, J.; Kuznetsova, L. V.; Ojima, I. *Bioorg. Med. Chem.* **2005**, *13*, 5043.
61. A QSAR Review on Melanoma Toxicity, Verma, R. P.; Mekapati, S. B.; Kurup, A.; Hansch, C. *Bioorg. Med. Chem.* **2005**, *13*, 5508.
62. Plant-based anticancer molecules: A chemical and biological profile of some important leads, Srivastava, V.; Singh Negi, A.; Kumar, J. K.; Gupta, M. M.; Khanuja, S. P. S. *Bioorg. Med. Chem.* **2005**, *13*, 5892.
63. The benefits of the multi-target approach in drug design and discovery, Espinoza-Fonseca, L. M. *Bioorg. Med. Chem.* **2006**, *14*, 896.
64. The Purines: Potent and versatile small molecule inhibitors and modulators of key biological targets, Legraverend, M.; Grierson, D. S. *Bioorg. Med. Chem.* **2006**, *14*, 3987.
65. Retinoic acid metabolism blocking agents (RAMBAs) for treatment of cancer and dermatological diseases, Njar, V. C. O.; Gediya, L.; Purushottamachar, P.; Chopra, P.; Vasaitis, T. S.; Khandelwal, A.; Mehta, J.; Huynh, C.; Belosay, A.; Patel, J. *Bioorg. Med. Chem.* **2006**, *14*, 4323.
66. *trans*-Fatty acids and radical stress: What are the real culprits? Chatgililoglu, C.; Ferreri, C.; Lykakis, I. N.; Wardman, P. *Bioorg. Med. Chem.* **2006**, *14*, 6144.
67. Role of small bioorganic molecules in stem cell differentiation to insulin-producing cells, Roche, E.; Jones, J.; Arribas, M. I.; Leon-Quinto, T.; Soria, B. *Bioorg. Med. Chem.* **2006**, *14*, 6466.
68. Hybrid molecules between distamycin A and active moieties of antitumor agents, Baraldi, P. G.; Preti, D.; Fruttarolo, F.; Tabrizi, M. A.; Romagnoli, R. *Bioorg. Med. Chem.* **2007**, *15*, 17.
69. Vascular disrupting agents, Lippert, III, J. W. *Bioorg. Med. Chem.* **2007**, *15*, 605.
70. Recent advances in proton pump inhibitors and management of acid-peptic disorders, Jain, K. S.; Shah, A. K.; Bariwal, J.; Shelke, S. M.; Kale, A. P.; Jagtap, J. R.; Bhosale, A. V. *Bioorg. Med. Chem.* **2007**, *15*, 1181.
71. Matrix metalloproteinases (MMPs): Chemical-biological functions and (Q)SARs, Verma, R. P.; Hansch, C. *Bioorg. Med. Chem.* **2007**, *15*, 2223.
72. Antituberculosis drugs: Ten years of research, Janin, Y. L. *Bioorg. Med. Chem.* **2007**, *15*, 2479.
73. Improved biochemical strategies for targeted delivery of taxoids, Ganesh, T. *Bioorg. Med. Chem.* **2007**, *15*, 3597.
74. Carbonic anhydrases as targets for medicinal chemistry, Supuran, C. T.; Scozzafava, A. *Bioorg. Med. Chem.* **2007**, *15*, 4336.
75. The biology and chemistry of hyperlipidemia, Jain, K. S.; Kathiravan, M. K.; Somani, R. S.; Shishoo, C. J. *Bioorg. Med. Chem.* **2007**, *15*, 4674.
76. Targeting cytochrome P450 enzymes: A new approach in anticancer drug development, Bruno, R. D.; Njar, V. C. O. *Bioorg. Med. Chem.* **2007**, *15*, 5047.
77. Significance of chirality in pheromone science, Mori, K. *Bioorg. Med. Chem.* **2007**, *15*, 7505.

78. Emerging trends in molecular recognition: Utility of weak aromatic interactions, Tewari, A. K.; Dubey, R. *Bioorg. Med. Chem.* **2008**, *16*, 126.
79. Synthesis of pharmaceutically active compounds containing a disubstituted piperidine framework, Källström, S.; Leino, R. *Bioorg. Med. Chem.* **2008**, *16*, 601.
80. Glycolipids as immunostimulating agents, Wu, D.; Fujio, M.; Wong, C-H. *Bioorg. Med. Chem.* **2008**, *16*, 1073.
81. Inhibitors of proteases and amide hydrolases that employ an α -ketoheterocycle as a key enabling functionality, Maryanoff, B. E.; Costanzo, M. J. *Bioorg. Med. Chem.* **2008**, *16*, 1562.
82. Tetramic and tetronic acids: An update on new derivatives and biological aspects, Schobert, R.; Schlenk, A. *Bioorg. Med. Chem.* **2008**, *16*, 4203.
83. Recent advances in selective α 1-adrenoreceptor antagonists as antihypertensive agents, Jain, K. S.; Bariwal, J. B.; Kathiravan, M. K.; Phoujdar, M. S.; Sahne, R. S.; Chauhan, B. S.; Shah, A. K.; Yadav, M. R. *Bioorg. Med. Chem.* **2008**, *16*, 4759.
84. Dihydropyridines and atypical MDR: A novel perspective of designing general reversal agents for both typical and atypical MDR, Miri, R.; Mehdipour, A. *Bioorg. Med. Chem.* **2008**, *16*, 8329.
85. Specific targeting of metzincin family members with small-molecule inhibitors: Progress toward a multifarious challenge, Georgiadis, D.; Yiotakis, A. *Bioorg. Med. Chem.* **2008**, *16*, 8781.
86. Current perspective of TACE inhibitors: A review, DasGupta, S.; Murumkar, P. R.; Giridhar, R.; Yadav, M. R. *Bioorg. Med. Chem.* **2009**, *17*, 444.
87. Medicinal chemistry approaches to the inhibition of dipeptidyl peptidase-4 for the treatment of type 2 diabetes, Havale, S. H.; Pal, M. *Bioorg. Med. Chem.* **2009**, *17*, 1783.
88. A brief tour of myxobacterial secondary metabolism, Weissman, K. J.; Müller, R. *Bioorg. Med. Chem.* **2009**, *17*, 2121.
89. The effect of individual N-glycans on enzyme activity, Skropeta, D. *Bioorg. Med. Chem.* **2009**, *17*, 2645.
90. Nanoparticles in cellular drug delivery, Faraji, A. H.; Wipf, P. *Bioorg. Med. Chem.* **2009**, *17*, 2950.
91. Antimalarials from nature, Kaur, K.; Jain, M.; Kaur, T.; Jain, R. *Bioorg. Med. Chem.* **2009**, *17*, 3229.
92. Purinergic P2X₇ receptor antagonists: Chemistry and fundamentals of biological screening, Gunosewoyo, H.; Coster, M. J.; Bennett, M. R.; Kassiou, M. *Bioorg. Med. Chem.* **2009**, *17*, 4861.
93. The search for potent, small molecule NNRTIs: A review, Prajapati, D. G.; Ramajayam, R.; Yadav, M. R.; Giridhar, R. *Bioorg. Med. Chem.* **2009**, *17*, 5744.
94. Developing a complete pharmacology for AMPA receptors: A perspective on subtype-selective ligands, Fleming, J. J.; England, P. M. *Bioorg. Med. Chem.* **2010**, *18*, 1381.