

# MOLECULAR PHARMACOLOGY

July 2006

Volume 70

Number 1

<http://molpharm.aspetjournals.org>

ISSN 0026-895X

## PERSPECTIVES

Class B GPCRs: A Hidden Agonist Within? 

*Martin Beinborn*

1

Potential of Acetylcholine Receptors by Divalent Cations 

*Jon Lindstrom*

5

## ACCELERATED COMMUNICATION

The Aryl Hydrocarbon Receptor Signaling Pathway Is Modified through Interactions with a Kelch Protein

*Elizabeth E. Dunham, Emily A. Stevens, Edward Glover, and Christopher A. Bradfield*

8

## ARTICLES

 Role of the Outer  $\beta$ -Sheet in Divalent Cation Modulation of  $\alpha 7$  Nicotinic Receptors

*James T. McLaughlin, Jie Fu, Adrian D. Sproul, and Robert L. Rosenberg*

16

High Accumulation of Platinum-DNA Adducts in Strial Marginal Cells of the Cochlea Is an Early Event in Cisplatin but Not Carboplatin Ototoxicity

*Jan Peter Thomas, Juergen Lautermann, Bernd Liedert, Frank Seiler, and Juergen Thomale*

23

The Phenotypic Differentiation of Locus Coeruleus Noradrenergic Neurons Mediated by Brain-Derived Neurotrophic Factor Is Enhanced by Corticotropin Releasing Factor through the Activation of a cAMP-Dependent Signaling Pathway

*Sabine Traver, Marc Marien, Elodie Martin, Etienne C. Hirsch, and Patrick P. Michel*

30

Sphingosine and Its Analog, the Immunosuppressant 2-Amino-2-(2-[4-octylphenyl]ethyl)-1,3-propanediol, Interact with the CB<sub>1</sub> Cannabinoid Receptor

*Steven W. Paugh, Michael P. Cassidy, Hengjun He, Sheldon Milstien, Laura J. Sim-Selley, Sarah Spiegel, and Dana E. Selley*

41

A Cannabinoid Quinone Inhibits Angiogenesis by Targeting Vascular Endothelial Cells

*Natalya M. Kogan, Cristina Blázquez, Luis Álvarez, Ruth Gallily, Michael Schlesinger, Manuel Guzmán, and Raphael Mechoulam*

51

The  and  symbols in the table of contents identify articles discussed in the *Perspectives*.

*Molecular Pharmacology* (ISSN 0026-895X) is published monthly (two volumes per year beginning in January and July) by the American Society for Pharmacology and Experimental Therapeutics, 9650 Rockville Pike, Bethesda, MD 20814-3995; e-mail: [info@aspet.org](mailto:info@aspet.org); Web site: <http://www.aspet.org>. Periodicals postage paid at Bethesda, MD and at additional mailing offices. POSTMASTER: Send address changes to *Molecular Pharmacology*, 9650 Rockville Pike, Bethesda, MD 20814-3995. Subscription Rates: U.S.: \$592.00 for institutions and \$241.00 for non-ASPET members. Outside the U.S.: \$673.00 for institutions and \$322.00 for non-ASPET members. Single copy:

\$57.00. GST Tax Number for Canadian subscribers: BN:13489 2330 RT. Indexed or abstracted by *Biochemistry & Biophysics Citation Index*®, *Biological Abstracts*, *BIOSIS Previews Database*, *Current Awareness in Biological Sciences*, *Current Contents*®/Life Sciences, *EMBASE/Excerpta Medica*, *Index Medicus*, *Medical Documentation Service*®, *Reference Update*®, *Research Alert*®, *Science Citation Index*®, *SciSearch*®, and *SIIC Data Bases*. Copyright © 2006 by the American Society for Pharmacology and Experimental Therapeutics. All rights reserved. Printed in the U.S.A.

Identification of Tubulin as the Molecular Target of Proapoptotic Pyrrolo-1,5-benzoxazepines <i>Jude M. Mulligan, Lisa M. Greene, Suzanne Cloonan, Margaret M. McGee, Valeria Onnis, Giuseppe Campiani, Caterina Fattorusso, Mark Lawler, D. Clive Williams, and Daniela M. Zisterer</i>	60
Receptor Regulation of Gene Expression of Axon Guidance Molecules: Implications for Adaptation <i>Amy K. Jassen, Hong Yang, Gregory M. Miller, Elizabeth Calder, and Bertha K. Madras</i>	71
Agonist-Induced Cell Surface Trafficking of an Intracellularly Sequestered D1 Dopamine Receptor Homo-Oligomer <i>Michael M. C. Kong, Theresa Fan, George Varghese, Brian F. O'Dowd, and Susan R. George</i>	78
Phosducin and Phosducin-like Protein Attenuate G-Protein-Coupled Receptor-Mediated Inhibition of Voltage-Gated Calcium Channels in Rat Sympathetic Neurons <i>John G. Partridge, Henry L. Puhl III, and Stephen R. Ikeda</i>	90
Interleukin-2 Suppression by 2-Arachidonyl Glycerol Is Mediated through Peroxisome Proliferator-Activated Receptor $\gamma$ Independently of Cannabinoid Receptors 1 and 2 <i>Cheryl E. Rockwell, Natasha T. Snider, Jerry T. Thompson, John P. Vanden Heuvel, and Norbert E. Kaminski</i>	101
Resveratrol Suppresses Tumor Necrosis Factor- $\alpha$ -Induced Fractalkine Expression in Endothelial Cells <i>Sang-Ok Moon, Won Kim, Mi Jeong Sung, Sik Lee, Kyung Pyo Kang, Duk Hoon Kim, Sang Yong Lee, June-No So, and Sung Kwang Park</i>	112
Structure-Function Analysis of Vitamin D 24-Hydroxylase (CYP24A1) by Site-Directed Mutagenesis: Amino Acid Residues Responsible for Species-Based Difference of CYP24A1 between Humans and Rats <i>Hiromi Hamamoto, Tatsuya Kusudo, Naoko Urushino, Hiroyuki Masuno, Keiko Yamamoto, Sachiko Yamada, Masaki Kamakura, Miho Ohta, Kuniyo Inouye, and Toshiyuki Sakaki</i>	120
▣ Novel $\alpha_1$ -Adrenergic Receptor Signaling Pathways: Secreted Factors and Interactions with the Extracellular Matrix <i>Ting Shi, Zhong-Hui Duan, Robert Papay, Elzbieta Pluskota, Robert J. Gaivin, Carol A. de la Motte, Edward F. Plow, and Dianne M. Perez</i>	129
Comparative Study of <i>ortho</i> - and <i>meta</i> -Nitrated Inhibitors of Catechol- <i>O</i> -methyltransferase: Interactions with the Active Site and Regioselectivity of <i>O</i> -Methylation <i>P. N. Palma, M. L. Rodrigues, M. Archer, M. J. Bonifácio, A. I. Loureiro, D. A. Learmonth, M. A. Carrondo, and P. Soares-da-Silva</i>	143
▣ Estrogens Cross-Talk to $\alpha_{1b}$ -Adrenergic Receptors <i>Aliesha González-Arenas, Beatriz Aguilar-Maldonado, S. Eréndira Avendaño-Vázquez, and J. Adolfo García-Sáinz</i>	154
Sustained Aryl Hydrocarbon Receptor Activity Attenuates Liver Regeneration <i>Kristen A. Mitchell, Courtney A. Lockhart, Gengming Huang, and Cornelis J. Elferink</i>	163
ZIP8, Member of the Solute-Carrier-39 (SLC39) Metal-Transporter Family: Characterization of Transporter Properties <i>Lei He, Kuppuswami Girijashanker, Timothy P. Dalton, Jodie Reed, Hong Li, Manoocher Soleimani, and Daniel W. Nebert</i>	171
▣ Allosteric Interactions with Muscarinic Acetylcholine Receptors: Complex Role of the Conserved Tryptophan M <sub>2</sub> <sup>422</sup> Trp in a Critical Cluster of Amino Acids for Baseline Affinity, Subtype Selectivity, and Cooperativity <i>Stefanie Prilla, Jasmin Schrobang, John Ellis, Hans-Dieter Höltje, and Klaus Mohr</i>	181
Analysis of G Protein $\beta\gamma$ Dimer Formation in Live Cells Using Multicolor Bimolecular Fluorescence Complementation Demonstrates Preferences of $\beta_1$ for Particular $\gamma$ Subunits <i>Stacy M. Mervine, Evan A. Yost, Jonathan L. Sabo, Thomas R. Hynes, and Catherine H. Berlot</i>	194

☐	Possible Endogenous Agonist Mechanism for the Activation of Secretin Family G Protein-Coupled Receptors <i>Maoqing Dong, Delia I. Pinon, Yan W. Asmann, and Laurence J. Miller</i>	206
	Relaxin Family Peptide Receptors RXFP1 and RXFP2 Modulate cAMP Signaling by Distinct Mechanisms <i>Michelle L. Halls, Ross A. D. Bathgate, and Roger J. Summers</i>	214
☐	Untranslated Region-Dependent Exclusive Expression of High-Sensitivity Subforms of $\alpha 4\beta 2$ and $\alpha 3\beta 2$ Nicotinic Acetylcholine Receptors <i>Clark A. Briggs, Earl J. Gubbins, Michael J. Marks, C. Brent Putman, Rama Thimmapaya, Michael D. Meyer, and Carol S. Surowy</i>	227
	Serum Amyloid A Induces Contrary Immune Responses via Formyl Peptide Receptor-Like 1 in Human Monocytes <i>Ha Young Lee, Mi-Kyoung Kim, Kyoung Sun Park, Eun Ha Shin, Seong Ho Jo, Sang Doo Kim, Eun Jin Jo, Youl-Nam Lee, Chuhee Lee, Suk-Hwan Baek, and Yoe-Sik Bae</i>	241
	Soluble Mimics of the Cytoplasmic Face of the Human V1-Vascular Vasopressin Receptor Bind Arrestin2 and Calmodulin <i>Nan Wu, Rosemarie Macion-Dazard, Stanley Nithianantham, Zhen Xu, Susan M. Hanson, Sergey A. Vishnivetskiy, Vsevolod V. Gurevich, Marc Thibonnier, and Menachem Shoham</i>	249
	Structural Determinants of 4-Chloro- <i>m</i> -cresol Required for Activation of Ryanodine Receptor Type 1 <i>Alan R. Jacobson, Scott T. Moe, P. D. Allen, and James D. Fessenden</i>	259
	The Promoter Region of the <i>MDR1</i> Gene Is Largely Invariant, but Different Single Nucleotide Polymorphism Haplotypes Affect <i>MDR1</i> Promoter Activity Differently in Different Cell Lines <i>Baoshuang Wang, Soomun Ngoi, Jingbo Wang, Samuel S. Chong, and Caroline G. L. Lee</i>	267
	Chemical Inducers of Rodent Glutathione <i>S</i> -Transferases Down-Regulate Human <i>GSTA1</i> Transcription through a Mechanism Involving Variant Hepatic Nuclear Factor 1-C <i>Laura Romero, Lorraine Ng, and Gordon M. Kirby</i>	277
	Functional Validation of the Genetic Polymorphisms of Human ATP-Binding Cassette (ABC) Transporter ABCG2: Identification of Alleles That Are Defective in Porphyrin Transport <i>Ai Tamura, Masato Watanabe, Hikaru Saito, Hiroshi Nakagawa, Toshiaki Kamachi, Ichiro Okura, and Toshihisa Ishikawa</i>	287
	Specific Rescue of Cystic Fibrosis Transmembrane Conductance Regulator Processing Mutants Using Pharmacological Chaperones <i>Ying Wang, M. Claire Bartlett, Tip W. Loo, and David M. Clarke</i>	297
	The Role of Human Nucleoside Transporters in Cellular Uptake of 4'-Thio- $\beta$ -D-arabinofuranosylcytosine and $\beta$ -D-Arabinosylcytosine <i>Marilyn L. Clarke, Vijaya L. Damaraju, Jing Zhang, Delores Mowles, Tracey Tackaberry, Thach Lang, Kyla M. Smith, James D. Young, Blake Tomkinson, and Carol E. Cass</i>	303
	Direct Modulation of Phospholipase D Activity by $G\beta\gamma$ <i>A. M. Preininger, L. G. Henage, W. M. Oldham, E. J. Yoon, H. E. Hamm, and H. A. Brown</i>	311
	Retinoic Acids Increase P2X <sub>2</sub> Receptor Expression through the 5'-Flanking Region of <i>P2rx2</i> Gene in Rat Phaeochromocytoma PC-12 Cells <i>Hidetoshi Tozaki-Saitoh, Schuichi Koizumi, Yoji Sato, Makoto Tsuda, Taku Nagao, and Kazuhide Inoue</i>	319
	Ketoconazole and Miconazole Are Antagonists of the Human Glucocorticoid Receptor: Consequences on the Expression and Function of the Constitutive Androstane Receptor and the Pregnane X Receptor <i>Cedric Duret, Martine Daujat-Chavanieu, Jean-Marc Pascussi, Lydiane Pichard-Garcia, Patrick Balaguer, Jean-Michel Fabre, Marie-José Vilarem, Patrick Maurel, and Sabine Gerbal-Chaloin</i>	329

Subtype Specificity of Scorpion $\beta$ -Toxin Tz1 Interaction with Voltage-Gated Sodium Channels Is Determined by the Pore Loop of Domain 3 <i>Enrico Leipold, Alfred Hansel, Adolfo Borges, and Stefan H. Heinemann</i>	340
☐ Modification and Uptake of a Cisplatin Carbonato Complex by Jurkat Cells <i>Corey R. Centerwall, Kirk A. Tacka, Deborah J. Kerwood, Jerry Goodisman, Bonnie B. Toms, Ronald L. Dubowy, and James C. Dabrowiak</i>	348
☐ Transfection of Drug-Specific T-Cell Receptors into Hybridoma Cells: Tools to Monitor Drug Interaction with T-Cell Receptors and Evaluate Cross-Reactivity to Related Compounds <i>Daphné Anne Schmid, Jan Paul Heribert Depta, Michael Lüthi, and Werner Joseph Pichler</i>	356
Inhibition of Human Tyrosyl-DNA Phosphodiesterase by Aminoglycoside Antibiotics and Ribosome Inhibitors <i>Zhiyong Liao, Laurent Thibaut, Andrew Jobson, and Yves Pommier</i>	366
☐ Experimental and Modeling Studies of Desensitization of P2X <sub>3</sub> Receptors <i>Elena Sokolova, Andrei Skorinkin, Igor Moiseev, Andrei Agrachev, Andrea Nistri, and Rashid Giniatullin</i>	373
Reducing and Oxidizing Agents Sensitize Heat-Activated Vanilloid Receptor (TRPV1) Current <i>Klara Susankova, Karolina Tousova, Ladislav Vyklicky, Jan Teisinger, and Viktorie Vlachova</i>	383
Neuroprotective Effects of 17 $\beta$ -Estradiol and Nonfeminizing Estrogens against H <sub>2</sub> O <sub>2</sub> Toxicity in Human Neuroblastoma SK-N-SH Cells <i>Xiaofei Wang, James A. Dykens, Evelyn Perez, Ran Liu, Shaohua Yang, Douglas F. Covey, and James W. Simpkins</i>	395
Potent Modulation of the Voltage-Gated Sodium Channel Na <sub>v</sub> 1.7 by OD1, a Toxin from the Scorpion <i>Odonthobuthus doriae</i> <i>Chantal Maertens, Eva Cuypers, Mehriar Amininasab, Amir Jalali, Hossein Vatanpour, and Jan Tytgat</i>	405
☐ Peroxisome Proliferator-Activated Receptor- $\gamma$ and Retinoic Acid X Receptor $\alpha$ Represses the <i>TGF<math>\beta</math>1</i> Gene via PTEN-Mediated p70 Ribosomal S6 Kinase-1 Inhibition: Role for Zf9 Dephosphorylation <i>Seung Jin Lee, Eun Kyoung Yang, and Sang Geon Kim</i>	415
A Boronic-Chalcone Derivative Exhibits Potent Anticancer Activity through Inhibition of the Proteasome <i>Geetha Achanta, Aneta Modzelewska, Li Feng, Saeed R. Khan, and Peng Huang</i>	426
<b>ERRATA</b>	
Correction to “No Nitric Oxide for HO-1 from Sodium Nitroprusside”	434
Correction to “Positive Inter-Regulation between $\beta$ -Catenin/T Cell Factor-4 Signaling and Endothelin-1 Signaling Potentiates Proliferation and Survival of Prostate Cancer Cells”	435

☐ Supplemental material is available online at <http://molpharm.aspetjournals.org>.

*About the cover:* A, M<sub>2</sub> wild type: interaction between W84 and the adjacent amino acids M<sub>2</sub><sup>177</sup>Tyr, M<sub>2</sub><sup>422</sup>Trp, and M<sub>2</sub><sup>423</sup>Thr; view from the top of the receptor protein occupied by W84 and NMS (partially visible at the bottom of the figure). See the article by Prilla et al. on page 181 of this issue.