

# INFECTION AND IMMUNITY

Volume 76

August 2008

No. 8

## SPOTLIGHT

Articles of Significant Interest Selected from This Issue  
by the Editors

3359

## MINIREVIEW

Bacteria in the Intestine, Helpful Residents or Enemies  
from Within?

Geraldine O. Canny and Beth A.  
McCormick

3360–3373

## MOLECULAR PATHOGENESIS

A Genome-Wide Proteome Array Reveals a Limited Set of  
Immunogens in Natural Infections of Humans and White-  
Footed Mice with *Borrelia burgdorferi*

Alan G. Barbour, Algimantas  
Jasinskas, Matthew A. Kayala, D.  
Huw Davies, Allen C. Steere, Pierre  
Baldi, and Philip L. Felgner

3374–3389

CcpA-Mediated Repression of Streptolysin S Expression and  
Virulence in the Group A Streptococcus

Traci L. Kinkel and Kevin S. McIver

3451–3463

Specific Roles of the *iroBCDEN* Genes in Virulence of an  
Avian Pathogenic *Escherichia coli* O78 Strain and in  
Production of Salmochelins

Mélissa Caza, François Lépine,  
Sylvain Milot, and Charles M.  
Dozois

3539–3549

Sortase A Utilizes an Ancillary Protein Anchor for Efficient  
Cell Wall Anchoring of Pili in *Streptococcus agalactiae*

Angela H. Nobbs, Roberto Rosini,  
C. Daniela Rinaudo, Domenico  
Maione, Guido Grandi, and John L.  
Telford

3550–3560

Screen for Leukotoxin Mutants in *Aggregatibacter*  
*actinomycetemcomitans*: Genes of the Phosphotransferase  
System Are Required for Leukotoxin Biosynthesis

Maria P. Isaza, Matthew S. Duncan,  
Jeffrey B. Kaplan, and Scott C.  
Kachlany

3561–3568

Metal Binding Specificity of the MntABC Permease of  
*Neisseria gonorrhoeae* and Its Influence on Bacterial  
Growth and Interaction with Cervical Epithelial Cells

Karen H. L. Lim, Christopher E.  
Jones, Rachel N. vanden Hoven,  
Jennifer L. Edwards, Megan L.  
Falsetta, Michael A. Apicella,  
Michael P. Jennings, and Alastair  
G. McEwan

3569–3576

Phenotypic and Genotypic Analyses of *Neisseria gonorrhoeae*  
Isolates That Express Frequently Recovered PorB P1A  
Variable Region Types Suggest that Certain P1a Porin  
Sequences Confer a Selective Advantage for Urogenital  
Tract Infection

Lotisha E. Garvin, Margaret C.  
Bash, Christine Keys, Douglas M.  
Warner, Sanjay Ram, William M.  
Shafer, and Ann E. Jerse

3700–3709

The Capsule Sensitizes *Streptococcus pneumoniae* to  
 $\alpha$ -Defensins Human Neutrophil Proteins 1 to 3

Katharina Beiter, Florian Wartha,  
Robert Hurwitz, Staffan Normark,  
Arturo Zychlinsky, and Birgitta  
Henriques-Normark

3710–3716

*Yersinia pestis* Type III Secretion System-Dependent  
Inhibition of Human Polymorphonuclear Leukocyte  
Function

Justin L. Spinner, Jennifer A.  
Cundiff, and Scott D. Kobayashi

3754–3760

Noncytotoxic *Clostridium perfringens* Enterotoxin (CPE)  
Variants Localize CPE Intestinal Binding and Demonstrate  
a Relationship between CPE-Induced Cytotoxicity and  
Enterotoxigenicity

James G. Smedley III, Juliann  
Saputo, Jacquelyn C. Parker,  
Mariano E. Fernandez-Miyakawa,  
Susan L. Robertson, Bruce A.  
McClane, and Francisco A. Uzal

3793–3800

Continued on following page

## CELLULAR MICROBIOLOGY: PATHOGEN-HOST CELL MOLECULAR INTERACTIONS

- Epidermal Growth Factor Inhibits *Campylobacter jejuni*-Induced Claudin-4 Disruption, Loss of Epithelial Barrier Function, and *Escherichia coli* Translocation** Jennifer M. Lamb-Rosteski, Lisa D. Kalischuk, G. Douglas Inglis, and Andre G. Buret 3390–3398
- MglA and Igl Proteins Contribute to the Modulation of *Francisella tularensis* Live Vaccine Strain-Containing Phagosomes in Murine Macrophages** Linda Bönquist, Helena Lindgren, Igor Golovliov, Tina Guina, and Anders Sjöstedt 3502–3510
- A Triacylated Lipoprotein from *Mycoplasma genitalium* Activates NF- $\kappa$ B through Toll-Like Receptor 1 (TLR1) and TLR2** Takashi Shimizu, Yutaka Kida, and Koichi Kuwano 3672–3678
- Shiga Toxin 2 Causes Apoptosis in Human Brain Microvascular Endothelial Cells via C/EBP Homologous Protein** Jun Fujii, Katie Wood, Fumiko Matsuda, Benedito A. Carneiro-Filho, Keilo H. Schlegel, Takashi Yutsudo, Beth Binnington-Boyd, Clifford A. Lingwood, Fumiko Obata, Kwang S. Kim, Shin-ichi Yoshida, and Tom Obrigg 3679–3689

## BACTERIAL INFECTIONS

- Cathelicidin LL-37 in Severe *Streptococcus pyogenes* Soft Tissue Infections in Humans** Linda Johansson, Pontus Thulin, Parham Sendi, Erika Hertzén, Adam Linder, Per Åkesson, Donald E. Low, Birgitta Agerberth, and Anna Norrby-Teglund 3399–3404
- Hypercholesterolemia Impairs Immunity to Tuberculosis** Gregory W. Martens, Meltem Cevik Arikan, Jinhee Lee, Fucheng Ren, Therese Vallerskog, and Hardy Kornfeld 3464–3472
- Identification of *fevR*, a Novel Regulator of Virulence Gene Expression in *Francisella novicida*** Anna Brotcke and Denise M. Monack 3473–3480
- Rat Pneumonia and Soft-Tissue Infection Models for the Study of *Acinetobacter baumannii* Biology** Thomas A. Russo, Janet M. Beanan, Ruth Olson, Ulrike MacDonald, Nicole R. Luke, Steven R. Gill, and Anthony A. Campagnari 3577–3586
- D-Alanylation of Lipoteichoic Acid Contributes to the Virulence of *Streptococcus suis*** Nahuel Fittipaldi, Tsutomu Sekizaki, Daisuke Takamatsu, José Harel, María de la Cruz Domínguez-Punaro, Sonja Von Aulock, Christian Draing, Corinne Marois, Marylène Kobisch, and Marcelo Gottschalk 3587–3594
- Vibrio cholerae* RND Family Efflux Systems Are Required for Antimicrobial Resistance, Optimal Virulence Factor Production, and Colonization of the Infant Mouse Small Intestine** Xiaowen R. Bina, Daniele Provenzano, Nathalie Nguyen, and James E. Bina 3595–3605
- Combined Deletion of Four *Francisella novicida* Acid Phosphatases Attenuates Virulence and Macrophage Vacuolar Escape** Nrusingh P. Mohapatra, Shilpa Soni, Thomas J. Reilly, Jirong Liu, Karl E. Klose, and John S. Gunn 3690–3699
- The Absence of Toll-Like Receptor 4 Signaling in C3H/HeJ Mice Predisposes Them to Overwhelming Rickettsial Infection and Decreased Protective Th1 Responses** Jeffrey M. Jordan, Michael E. Woods, Juan Olano, and David H. Walker 3717–3724
- Differential Activation of Human and Mouse Toll-Like Receptor 4 by the Adjuvant Candidate LpxL1 of *Neisseria meningitidis*** Liana Steeghs, A. Marijke Keestra, Andries van Mourik, Heli Uronen-Hansson, Peter van der Ley, Robin Callard, Nigel Klein, and Jos P. M. van Putten 3801–3807

<b>The Fibrinogen- and Fibronectin-Binding Domains of <i>Staphylococcus aureus</i> Fibronectin-Binding Protein A Synergistically Promote Endothelial Invasion and Experimental Endocarditis</b>	Lionel Piroth, Yok-Ai Que, Eleonora Widmer, Alexandre Panchaud, Stéphane Piu, José M. Entenza, and Philippe Moreillon	3824–3831
<b>HOST RESPONSE AND INFLAMMATION</b>		
<b>Proteomic Analysis of and Immune Responses to <i>Ehrlichia chaffeensis</i> Lipoproteins</b>	Haibin Huang, Mingqun Lin, Xueqi Wang, Takane Kikuchi, Heather Mottaz, Angela Norbeck, and Yasuko Rikihisa	3405–3414
<b>Mutans Streptococcal Infection Induces Salivary Antibody to Virulence Proteins and Associated Functional Domains</b>	R. D. Nogueira, W. F. King, G. Gunda, S. Culshaw, M. A. Taubman, R. O. Mattos-Graner, and D. J. Smith	3606–3613
<b>Distinct Isoforms of Phospholipase A<sub>2</sub> Mediate the Ability of <i>Salmonella enterica</i> Serotype Typhimurium and <i>Shigella flexneri</i> To Induce the Transepithelial Migration of Neutrophils</b>	Karen L. Mumy, Jeffrey D. Bien, Michael A. Pazos, Karsten Gronert, Bryan P. Hurley, and Beth A. McCormick	3614–3627
<b>Interleukin-12 (IL-12) and IL-23 Induction of Substance P Synthesis in Murine T Cells and Macrophages Is Subject to IL-10 and Transforming Growth Factor <math>\beta</math> Regulation</b>	Arthur Blum, Tommy Setiawan, Long Hang, Korynn Stoyanoff, and Joel V. Weinstock	3651–3656
<b>An Interleukin-1<math>\beta</math> (IL-1<math>\beta</math>) Single-Nucleotide Polymorphism at Position 3954 and Red Complex Periodontopathogens Independently and Additively Modulate the Levels of IL-1<math>\beta</math> in Diseased Periodontal Tissues</b>	Samuel B. Ferreira, Jr., Ana Paula F. Trombone, Carlos E. Repeke, Cristina R. Cardoso, Walter Martins, Jr., Carlos F. Santos, Paula Cristina Trevilatto, Mario J. Ávila-Campos, Ana Paula Campanelli, João S. Silva, and Gustavo P. Garlet	3725–3734
<b>FUNGAL AND PARASITIC INFECTIONS</b>		
<b>The Chlamydial Plasmid-Encoded Protein pp3 Is Secreted into the Cytosol of <i>Chlamydia</i>-Infected Cells</b>	Zhongyu Li, Ding Chen, Youmin Zhong, Shiping Wang, and Guangming Zhong	3415–3428
<b><i>Aspergillus fumigatus</i> Stimulates Leukocyte Adhesion Molecules and Cytokine Production by Endothelial Cells In Vitro and during Invasive Pulmonary Disease</b>	Lisa Y. Chiang, Donald C. Sheppard, Fabrice N. Gravelat, Thomas F. Patterson, and Scott G. Filler	3429–3438
<b><i>Pneumocystis murina</i> Infection and Cigarette Smoke Exposure Interact To Cause Increased Organism Burden, Development of Airspace Enlargement, and Pulmonary Inflammation in Mice</b>	Paul J. Christensen, Angela M. Preston, Tony Ling, Ming Du, W. Bradley Fields, Jeffrey L. Curtis, and James M. Beck	3481–3490
<b>Temporal and Spatial Distribution of <i>Toxoplasma gondii</i> Differentiation into Bradyzoites and Tissue Cyst Formation In Vivo</b>	Manlio Di Cristina, Daniela Marocco, Roberto Galizi, Carla Proietti, Roberta Spaccapelo, and Andrea Crisanti	3491–3501
<b>Hookworm-Induced Persistent Changes to the Immunological Environment of the Lung</b>	Joshua J. Reece, Mark C. Siracusa, Teresa L. Southard, Cory F. Brayton, Joseph F. Urban, Jr., and Alan L. Scott	3511–3524
<b>Persistently Infected Horses Are Reservoirs for Intrastadial Tick-Borne Transmission of the Apicomplexan Parasite <i>Babesia equi</i></b>	Massaro W. Ueti, Guy H. Palmer, Glen A. Scoles, Lowell S. Kappmeyer, and Donald P. Knowles	3525–3529
<b>A Novel Immunoprecipitation Strategy Identifies a Unique Functional Mimic of the Glial Cell Line-Derived Neurotrophic Factor Family Ligands in the Pathogen <i>Trypanosoma cruzi</i></b>	Bo Lu and Mercio PereiraPerrin	3530–3538

<b>Effector CD8<sup>+</sup> T Lymphocytes against Liver Stages of <i>Plasmodium yoelii</i> Do Not Require Gamma Interferon for Antiparasite Activity</b>	Sumana Chakravarty, G. Christian Baldeviano, Michael G. Overstreet, and Fidel Zavala	3628–3631
<b>In Vivo Analysis of <i>Aspergillus fumigatus</i> Developmental Gene Expression Determined by Real-Time Reverse Transcription-PCR</b>	Fabrice N. Gravelat, Thomas Doedt, Lisa Y. Chiang, Hong Liu, Scott G. Filler, Thomas F. Patterson, and Donald C. Sheppard	3632–3639
<b>Cooperative Role of Macrophages and Neutrophils in Host Antiprotozoan Resistance in Mice Acutely Infected with <i>Cryptosporidium parvum</i></b>	Dan Takeuchi, Vickie C. Jones, Makiko Kobayashi, and Fujio Suzuki	3657–3663
<b>The Terminal Sialic Acid of Glycoconjugates on the Surface of Intestinal Epithelial Cells Activates Excystation of <i>Cryptosporidium parvum</i></b>	Naheed Choudhry, Mona Bajaj-Elliott, and Vincent McDonald	3735–3741
<b>Inhibition of Apoptosis in <i>Cryptosporidium parvum</i>-Infected Intestinal Epithelial Cells Is Dependent on Survivin</b>	Jin Liu, Shinichiro Enomoto, Cheryl A. Lancto, Mitchell S. Abrahamsen, and Mark S. Rutherford	3784–3792
<b>MICROBIAL IMMUNITY AND VACCINES</b>		
<b>Selected <i>prfA</i>* Mutations in Recombinant Attenuated <i>Listeria monocytogenes</i> Strains Augment Expression of Foreign Immunogens and Enhance Vaccine-Elicited Humoral and Cellular Immune Responses</b>	Lin Yan, Jin Qiu, Jianbo Chen, Bridgett Ryan-Payseur, Dan Huang, Yunqi Wang, Lijun Rong, Jody A. Melton-Witt, Nancy E. Freitag, and Zheng W. Chen	3439–3450
<b>Effective Plague Vaccination via Oral Delivery of Plant Cells Expressing F1-V Antigens in Chloroplasts</b>	Philip A. Arlen, Michael Singleton, Jeffrey J. Adamovicz, Yi Ding, Abdolreza Davoodi-Semiromi, and Henry Daniell	3640–3650
<b>Native Outer Membrane Proteins Protect Mice against Pulmonary Challenge with Virulent Type A <i>Francisella tularensis</i></b>	Jason F. Huntley, Patrick G. Conley, David A. Rasko, Kayla E. Hagman, Michael A. Apicella, and Michael V. Norgard	3664–3671
<b>Constitutive Activation of the PrfA Regulon Enhances the Potency of Vaccines Based on Live-Attenuated and Killed but Metabolically Active <i>Listeria monocytogenes</i> Strains</b>	Peter Lauer, Bill Hanson, Edward E. Lemmens, Weiqun Liu, William S. Luckett, Meredith L. Leong, Heather E. Allen, Justin Skoble, Keith S. Bahjat, Nancy E. Freitag, Dirk G. Brockstedt, and Thomas W. Dubensky, Jr.	3742–3753
<b>Impaired Opsonization with C3b and Phagocytosis of <i>Streptococcus pneumoniae</i> in Sera from Subjects with Defects in the Classical Complement Pathway</b>	Jose Yuste, Ashwin Sen, Lennart Truedsson, Göran Jönsson, Liang-Seah Tay, Catherine Hyams, Helen E. Baxendale, Fiona Goldblatt, Marina Botto, and Jeremy S. Brown	3761–3770
<b>Oral Vaccination of Guinea Pigs with a <i>Mycobacterium bovis</i> Bacillus Calmette-Guérin Vaccine in a Lipid Matrix Protects against Aerosol Infection with Virulent <i>M. bovis</i></b>	Simon Clark, Martin L. Cross, Allan Nadian, Julia Vipond, Pinar Court, Ann Williams, R. Glyn Hewinson, Frank E. Aldwell, and Mark A. Chambers	3771–3776
<b>Immunization with a Toll-Like Receptor 7 and/or 8 Agonist Vaccine Adjuvant Increases Protective Immunity against <i>Leishmania major</i> in BALB/c Mice</b>	Wen-Wei Zhang and Greg Matlashewski	3777–3783
<b>Oral Vaccination against Bubonic Plague Using a Live Avirulent <i>Yersinia pseudotuberculosis</i> Strain</b>	Thierry Blisnick, Patrick Ave, Michel Huerre, Elisabeth Carniel, and Christian E. Demeure	3808–3816
<b>The Oligomerization Domain of C4-Binding Protein (C4bp) Acts as an Adjuvant, and the Fusion Protein Comprised of the 19-Kilodalton Merozoite Surface Protein 1 Fused with the Murine C4bp Domain Protects Mice against Malaria</b>	Solabomi A. Ogun, Laurence Dumon-Seignovert, Jean-Baptiste Marchand, Anthony A. Holder, and Fergal Hill	3817–3823