



CONTENTS • JULY 2019 • VOLUME 63, NO. 7

CHALLENGING CLINICAL CASE IN ANTIMICROBIAL RESISTANCE

- Treatment of Multidrug-Resistant Vancomycin-Resistant *Enterococcus faecium* Hardware-Associated Vertebral Osteomyelitis with Oritavancin plus Ampicillin** e02622-18

Samira Dahesh, Brian Wong, Victor Nizet, George Sakoulas, Truc T. Tran (Commentator), Samuel L. Aitken (Commentator)

MECHANISMS OF ACTION: PHYSIOLOGICAL EFFECTS

- Spontaneously Arising *Streptococcus mutans* Variants with Reduced Susceptibility to Chlorhexidine Display Genetic Defects and Diminished Fitness** e00161-19

Justin R. Kaspar, Matthew J. Godwin, Irina M. Velsko, Vincent P. Richards, Robert A. Burne

- Antibiotic Killing of Diversely Generated Populations of Nonreplicating Bacteria** e02360-18

Ingrid C. McCall, Nilang Shah, Adithi Govindan, Fernando Baquero, Bruce R. Levin

MECHANISMS OF RESISTANCE

- Isoniazid Resistance in *Mycobacterium tuberculosis* Is a Heterogeneous Phenotype Composed of Overlapping MIC Distributions with Different Underlying Resistance Mechanisms** e00092-19

Arash Ghodousi, Elisa Tagliani, Eranga Karunaratne, Stefan Niemann, Jennifer Perera, Claudio U. Köser, Daniela Maria Cirillo

- Application of CRISPR/Cas9-Based Genome Editing in Studying the Mechanism of Pandrug Resistance in *Klebsiella pneumoniae*** e00113-19

Qiaoling Sun, Yu Wang, Ning Dong, Lingwei Shen, Hongwei Zhou, Yanyan Hu, Danxia Gu, Sheng Chen, Rong Zhang, Quanjiang Ji

- Emerging *erm*(B)-Mediated Macrolide Resistance Associated with Novel Multidrug Resistance Genomic Islands in *Campylobacter*** e00153-19

Dejun Liu, Weiwen Liu, Ziquan Lv, Junjie Xia, Xing Li, Yuxin Hao, Ying Zhou, Hong Yao, Zhihai Liu, Yang Wang, Jianzhong Shen, Yuebin Ke, Zhangqi Shen

- Link between Heat Shock Protein 90 and the Mitochondrial Respiratory Chain in the Caspofungin Stress Response of *Aspergillus fumigatus*** e00208-19

M. Aruanno, D. Bachmann, D. Sanglard, F. Lamothe

- The Combination Rifampin-Nitazoxanide, but Not Rifampin-Isoniazid-Pyrazinamide-Ethambutol, Kills Dormant *Mycobacterium tuberculosis* in Hypoxia at Neutral pH** e00273-19

Angelo Iacobino, Federico Giannoni, Manuela Pardini, Giovanni Piccaro, Lanfranco Fattorini

- Two Hypervirulent *Klebsiella pneumoniae* Isolates Producing a *bla*<sub>KPC-2</sub> Carbapenemase from a Canadian Patient** e00517-19

Laura F. Mataseje, David A. Boyd, Michael R. Mulvey, Yves Longtin

- Identification of a Carbapenemase-Producing Hypervirulent *Klebsiella pneumoniae* Isolate in the United States** e00519-19

Maria Karlsson, Richard A. Stanton, Uzma Ansari, Gillian McAllister, Monica Y. Chan, Erisa Sula, Julian E. Grass, Nadezhda Duffy, Melissa L. Anacker, Medora L. Witwer, J. Kamile Rasheed, Christopher A. Elkins, Alison Laufer Halpin

- New Insights into the Cyp51 Contribution to Azole Resistance in *Aspergillus* Section *Nigri*** e00543-19  
*Alba Pérez-Cantero, Loida López-Fernández, Josep Guarro, Javier Capilla*
- Functional Characterization of a Miniature Inverted Transposable Element at the Origin of *mcr-5* Gene Acquisition in *Escherichia coli*** e00559-19  
*Nicolas Kieffer, Patrice Nordmann, Yves Millemann, Laurent Poirel*
- The Essential Role of Hypermutation in Rapid Adaptation to Antibiotic Stress** e00744-19  
*Heer H. Mehta, Amy G. Prater, Kathryn Beabout, Ryan A. L. Elworth, Mark Karavis, Henry S. Gibbons, Yousif Shamoo*
- Defects in Efflux (*oprM*),  $\beta$ -Lactamase (*ampC*), and Lipopolysaccharide Transport (*lptE*) Genes Mediate Antibiotic Hypersusceptibility of *Pseudomonas aeruginosa* Strain Z61** e00784-19  
*Xiaoyu Shen, Nicole V. Johnson, Naomi N. K. Kreamer, S. Whitney Barnes, John R. Walker, Angela L. Woods, David A. Six, C. R. Dean*
- Low Level of Antifungal Resistance in Iranian Isolates of *Candida glabrata* Recovered from Blood Samples in a Multicenter Study from 2015 to 2018 and Potential Prognostic Values of Genotyping and Sequencing of *PDR1*** e02503-18  
*Amir Arastehfar, Farnaz Daneshnia, Kamiar Zomorodian, Mohammad Javad Najafzadeh, Sadegh Khodavaisy, Hossein Zarrinfar, Ferry Hagen, Zahra Zare Shahrabadi, Michaela Lackner, Hossein Mirhendi, Mohammadreza Salehi, Maryam Roudbary, Weihua Pan, Markus Kostrzewa, Teun Boekhout*
- Phylogenomic Investigation of Inc11- $\gamma$  Plasmids Harboring *bla*<sub>CMY-2</sub> and *bla*<sub>SHV-12</sub> in *Salmonella enterica* and *Escherichia coli* in Multiple Countries** e02546-18  
*Luis Ricardo Castellanos, Linda van der Graaf-van Bloois, Pilar Donado-Godoy, Dik J. Mevius, Jaap A. Wagenaar, Joost Hordijk, Aldert L. Zomer*
- SUSCEPTIBILITY**
- U.S.-Based National Surveillance for Fidaxomicin Susceptibility of *Clostridioides difficile*-Associated Diarrheal Isolates from 2013 to 2016** e00391-19  
*C. M. Thorpe, L. A. McDermott, M. K. Tran, J. Chang, S. G. Jenkins, E. J. C. Goldstein, R. Patel, B. A. Forbes, S. Johnson, D. N. Gerding, D. R. Snyderman*
- Bicarbonate Resensitization of Methicillin-Resistant *Staphylococcus aureus* to  $\beta$ -Lactam Antibiotics** e00496-19  
*Selvi C. Ersoy, Wessam Abdelhady, Liang Li, Henry F. Chambers, Yan Q. Xiong, Arnold S. Bayer*
- Natamycin and Voriconazole Exhibit Synergistic Interactions with Nonantifungal Ophthalmic Agents against *Fusarium* Species Ocular Isolates** e02505-18  
*Christiaan A. Rees, Ruina Bao, Michael E. Zegans, Robert A. Cramer*
- Comparing Antimicrobial Susceptibilities among *Mycoplasma pneumoniae* Isolates from Pediatric Patients in Japan between Two Recent Epidemic Periods** e02517-18  
*Tomohiro Oishi, Kento Takahashi, Shoko Wakabayashi, Yoshitaka Nakamura, Sahoko Ono, Mina Kono, Atsushi Kato, Aki Saito, Eisuke Kondo, Yuhei Tanaka, Hideto Teranishi, Hiroto Akaike, Takaaki Tanaka, Ippei Miyata, Satoko Ogita, Naoki Ohno, Takashi Nakano, Kazunobu Ouchi*
- In Vitro* Activity of Fenticonazole against *Candida* and Bacterial Vaginitis Isolates Determined by Mono- or Dual-Species Testing Assays** e02693-18  
*Maurizio Sanguinetti, Emilia Cantón, Riccardo Torelli, Fabio Tumietto, Ana Espinel-Ingroff, Brunella Posteraro*

**BIOLOGIC RESPONSE MODIFIERS**

- Mycobacterium abscessus* Cells Have Altered Antibiotic Tolerance and Surface Glycolipids in Artificial Cystic Fibrosis Sputum Medium** e02488-18  
*Augusto Cesar Hunt-Serracin, Brian J. Parks, Joseph Boll, Cara C. Boutte*

**ANALYTICAL PROCEDURES**

- Efficient Inactivation of Clinically Relevant Antimicrobial Drug Concentrations by BacT/Alert or Bactec Resin-Containing Media in Simulated Adult Blood Cultures** e00420-19  
*Giulia Menchinelli, Flora Marzia Liotti, Liliana Giordano, Giulia De Angelis, Maurizio Sanguinetti, Teresa Spanu, Brunella Posteraro*
- Simplified Testing Method for Direct Detection of Carbapenemase-Producing Organisms from Positive Blood Cultures Using the NG-Test Carba 5 Assay** e00550-19  
*Liliana Giordano, Barbara Fiori, Tiziana D'Inzeo, Gabriella Parisi, Flora Marzia Liotti, Giulia Menchinelli, Giulia De Angelis, Flavio De Maio, Francesco Luzzaro, Maurizio Sanguinetti, Brunella Posteraro, Teresa Spanu*

**ANTIVIRAL AGENTS**

- Nucleoside Analogs with Selective Antiviral Activity against Dengue Fever and Japanese Encephalitis Viruses** e00397-19  
*Keivan Zandi, Leda Bassit, Franck Amblard, Bryan D. Cox, Pouya Hassandarvish, Ehsan Moghaddam, Andrew Yueh, Gisele Olinto Libanio Rodrigues, Ingredy Passos, Vivian V. Costa, Szaly AbuBakar, Longhu Zhou, James Kohler, Mauro M. Teixeira, Raymond F. Schinazi*
- Novel Central Nervous System (CNS)-Targeting Protease Inhibitors for Drug-Resistant HIV Infection and HIV-Associated CNS Complications** e00466-19  
*Masayuki Amano, Pedro Miguel Salcedo-Gómez, Ravikiran S. Yedidi, Rui Zhao, Hironori Hayashi, Kazuya Hasegawa, Tomofumi Nakamura, Cuthbert D. Martyr, Arun K. Ghosh, Hiroaki Mitsuya*

**EPIDEMIOLOGY AND SURVEILLANCE**

- Comparative Activities of Ceftazidime-Avibactam and Ceftolozane-Tazobactam against *Enterobacteriaceae* Isolates Producing Extended-Spectrum  $\beta$ -Lactamases from U.S. Hospitals** e00160-19  
*Mariana Castanheira, Timothy B. Doyle, Rodrigo E. Mendes, Helio S. Sader*
- Trends in and Predictors of Carbapenem Consumption across North American Hospitals: Results from a Multicenter Survey by the MAD-ID Research Network** e00327-19  
*Nathaniel J. Rhodes, Jamie L. Wagner, Susan L. Davis, John A. Bosso, Debra A. Goff, Michael J. Rybak, Marc H. Scheetz, on behalf of the MAD-ID Research Network*
- The Microbiology of Bloodstream Infection: 20-Year Trends from the SENTRY Antimicrobial Surveillance Program** e00355-19  
*Daniel J. Diekema, Po-Ren Hsueh, Rodrigo E. Mendes, Michael A. Pfaller, Kenneth V. Rolston, Helio S. Sader, Ronald N. Jones*
- Independent Host Factors and Bacterial Genetic Determinants of the Emergence and Dominance of *Escherichia coli* Sequence Type 131 CTX-M-27 in a Community Pediatric Cohort Study** e00382-19  
*André Birgy, Corinne Levy, Marie-Hélène Nicolas-Chanoine, Aurélie Cointe, Claire A. Hobson, Mélanie Magnan, Stéphane Bechet, Philippe Bidet, Robert Cohen, Stéphane Bonacorsi*

- In Vitro* Activity of Cefepime-Enmetazobactam against Gram-Negative Isolates Collected from U.S. and European Hospitals during 2014–2015** e00514-19  
*Ian Morrissey, Sophie Magnet, Stephen Hawser, Stuart Shapiro, Philipp Knechtle*
- Polymorphisms in *Plasmodium falciparum* Kelch 13 and *P. vivax* Kelch 12 Genes in Parasites Collected from Three South Pacific Countries Prior to Extensive Exposure to Artemisinin Combination Therapies** e00536-19  
*Karryn Gresty, Karen Anderson, Cielo Pasay, Norman C. Waters, Qin Cheng*
- Joint Modeling of Resistance to Six Antimicrobials in Urinary *Escherichia coli* Isolates in Quebec, Canada** e02531-18  
*Jean-Paul R. Soucy, Alexandra M. Schmidt, Charles Frenette, Patrick Dolcé, Alexandre A. Boudreault, David L. Buckeridge, Caroline Quach*
- EXPERIMENTAL THERAPEUTICS**
- Isolation of Phage Lysins That Effectively Kill *Pseudomonas aeruginosa* in Mouse Models of Lung and Skin Infection** e00024-19  
*Assaf Raz, Anna Serrano, Anaise Hernandez, Chad W. Euler, Vincent A. Fischetti*
- Efficacy of Human Exposures of Gepotidacin (GSK2140944) against *Escherichia coli* in a Rat Pyelonephritis Model** e00086-19  
*Jennifer L. Hoover, Christine M. Singley, Philippa Elefante, Stephen Rittenhouse*
- Combining Ceftriaxone with Doxycycline and Daptomycin Reduces Mortality, Neuroinflammation, Brain Damage, and Hearing Loss in Infant Rat Pneumococcal Meningitis** e00220-19  
*Lukas Muri, Michael Perny, Jonas Zemp, Denis Grandgirard, Stephen L. Leib*
- Synergistic Effect of Colistin Combined with PFK-158 against Colistin-Resistant *Enterobacteriaceae*** e00271-19  
*Youwen Zhang, Xiukun Wang, Xue Li, Limin Dong, Xinxin Hu, Tongying Nie, Yun Lu, Xi Lu, Jing Pang, Guoqing Li, Xinyi Yang, Congran Li, Xuefu You*
- Nitroglycerin-Citrate-Ethanol Catheter Lock Solution Is Highly Effective for *In Vitro* Eradication of *Candida auris* Biofilm** e00299-19  
*Nylev Vargas-Cruz, Ruth A. Reitzel, Joel Rosenblatt, Anne-Marie Chaftari, Rita Wilson Dib, Ray Hachem, Dimitrios P. Kontoyiannis, Issam I. Raad*
- Advancing the Therapeutic Potential of Indoleamides for Tuberculosis** e00343-19  
*Shichun Lun, Rokeya Tasneen, Tridib Chaira, Jozef Stec, Oluseye K. Onajole, Tian J. Yang, Christopher B. Cooper, Khisi Mdluli, Paul J. Converse, Eric L. Nuermberger, V. Samuel Raj, Alan Kozikowski, William R. Bishai*
- Shortening Buruli Ulcer Treatment with Combination Therapy Targeting the Respiratory Chain and Exploiting *Mycobacterium ulcerans* Gene Decay** e00426-19  
*Paul J. Converse, Deepak V. Almeida, Sandeep Tyagi, Jian Xu, Eric L. Nuermberger*
- In Vivo* Pharmacodynamics of Omadacycline against *Staphylococcus aureus* in the Neutropenic Murine Thigh Infection Model** e00624-19  
*Alexander J. Lepak, Miao Zhao, Karen Marchillo, Jamie VanHecker, David R. Andes*
- Efficacy of Aerosolized Rifaximin versus Tobramycin for Treatment of *Pseudomonas aeruginosa* Pneumonia in Mice** e02341-18  
*Brandon D. Kirby, Roy Al Ahmar, T. Ryan Withers, Meagan E. Valentine, Monica Valentovic, Timothy E. Long, James R. Gaskins, Hongwei D. Yu*

- Identifying Regimens Containing TBI-166, a New Drug Candidate against *Mycobacterium tuberculosis* In Vitro and In Vivo** e02496-18  
*Ye Zhang, Hui Zhu, Lei Fu, Bin Wang, Shaochen Guo, Xi Chen, Zhongquan Liu, Haihong Huang, Tianjian Yang, Yu Lu*
- Treatment with Bumped Kinase Inhibitor 1294 Is Safe and Leads to Significant Protection against Abortion and Vertical Transmission in Sheep Experimentally Infected with *Toxoplasma gondii* during Pregnancy** e02527-18  
*Roberto Sánchez-Sánchez, Ignacio Ferre, Michela Re, Juan José Ramos, Javier Regidor-Cerrillo, Manuel Pizarro Díaz, Marta González-Huecas, Enrique Tabanera, Julio Benavides, Andrew Hemphill, Matthew A. Hulverson, Lynn K. Barrett, Ryan Choi, Grant R. Whitman, Kayode K. Ojo, Wesley C. Van Voorhis, Luis Miguel Ortega-Mora*
- CLINICAL THERAPEUTICS**
- Modified Mouse Model of *Clostridioides difficile* Infection as a Platform for Probiotic Efficacy Studies** e00111-19  
*T. J. De Wolfe, A. E. Kates, L. Barko, B. J. Darien, N. Safdar*
- Molecular Testing of Serial Blood Specimens from Patients with Early Lyme Disease during Treatment Reveals Changing Coinfection with Mixtures of *Borrelia burgdorferi* Genotypes** e00237-19  
*Michael R. Mosel, Heather E. Carolan, Alison W. Rebman, Steven Castro, Christian Massire, David J. Ecker, Mark J. Soloski, John N. Aucott, Mark W. Eshoo*
- Fluoroquinolones in Drug-Resistant Tuberculosis: Culture Conversion and Pharmacokinetic/Pharmacodynamic Target Attainment To Guide Dose Selection** e00279-19  
*Mohammad H. Al-Shaer, Wael A. Alghamdi, Abdullah Alsultan, Guohua An, Shahriar Ahmed, Yosra Alkabab, Sayera Banu, Ketevan Barbakadze, Eric Houpt, Maia Kipiani, Lali Mikiashvili, J. Peter Cegielski, Russell R. Kempker, Scott K. Heysell, Charles A. Peloquin*
- Prospective Observational Study of the Clinical Prognoses of Patients with Bloodstream Infections Caused by Ampicillin-Susceptible but Penicillin-Resistant *Enterococcus faecalis*** e00291-19  
*Dokyun Kim, Hyukmin Lee, Eun-Jeong Yoon, Jun Sung Hong, Jong Hee Shin, Young Uh, Kyeong Seob Shin, Jeong Hwan Shin, Young Ah Kim, Yoon Soo Park, Seok Hoon Jeong*
- Population Pharmacokinetics of Anidulafungin in Critically Ill Patients** e00378-19  
*S. Luque, W. Hope, N. Campillo, R. Muñoz-Bermúdez, L. Sorli, J. Barceló-Vidal, E. González-Colominas, F. Alvarez-Lerma, J. R. Masclans, M. Montero, J. P. Horcajada, S. Grau*
- Limited Sampling Strategies Using Linear Regression and the Bayesian Approach for Therapeutic Drug Monitoring of Moxifloxacin in Tuberculosis Patients** e00384-19  
*Simone H. J. van den Elsen, Marieke G. G. Sturkenboom, Onno W. Akkerman, Katerina Manika, Ioannis P. Kioumis, Tjip S. van der Werf, John L. Johnson, Charles Peloquin, Daan J. Touw, Jan-Willem C. Alffenaar*
- Comparable Efficacy and Better Safety of Double  $\beta$ -Lactam Combination Therapy versus  $\beta$ -Lactam plus Aminoglycoside in Gram-Negative Bacteria in Randomized, Controlled Trials** e00425-19  
*Yuanyuan Jiao, Bartolome Moya, Mong-Jen Chen, Alexandre P. Zavascki, Hsinyin Tsai, Xun Tao, Dhruvitkumar S. Sutaria, Arnold Louie, John D. Boyce, Deanna Deveson Lucas, Tae Hwan Kim, Brian T. Tsuji, Robert A. Bonomo, George L. Drusano, Jürgen B. Bulitta*

- Efficacy and Safety of Tedizolid Phosphate versus Linezolid in a Randomized Phase 3 Trial in Patients with Acute Bacterial Skin and Skin Structure Infection** e02252-18  
*Xiaoju Lv, Jeff Alder, Li Li, William O’Riordan, Michael J. Rybak, Hui Ye, Ruiping Zhang, Zhongqi Zhang, Xu Zhu, Mark H. Wilcox*
- A First-in-Human Study To Assess the Safety and Pharmacokinetics of LYS228, a Novel Intravenous Monobactam Antibiotic in Healthy Volunteers** e02592-18  
*Megan Osborn, Noah Stachulski, Haiying Sun, Johanne Blais, Vinay Venishetty, Marc Raccuglia, Martin Kankam, Richard Colvin, Florencia Segal*
- PHARMACOLOGY**
- Using *Mycobacterium tuberculosis* Single-Nucleotide Polymorphisms To Predict Fluoroquinolone Treatment Response** e00076-19  
*Marva Seifert, Edmund Capparelli, Donald G. Catanzaro, Timothy C. Rodwell*
- Comparative Performance of Urinary Biomarkers for Vancomycin-Induced Kidney Injury According to Timeline of Injury** e00079-19  
*Gwendolyn M. Pais, Sean N. Avedissian, J. Nicholas O’Donnell, Nathaniel J. Rhodes, Thomas P. Lodise, Walter C. Prozialeck, Peter C. Lamar, Cameron Cluff, Anil Gulati, Julie C. Fitzgerald, Kevin J. Downes, Athena F. Zuppa, Marc H. Scheetz*
- In Vitro* Pharmacodynamics of a Novel Ceftibuten-Clavulanate Combination Antibiotic against *Enterobacteriaceae*** e00144-19  
*Mordechai Grupper, Sean M. Stainton, David P. Nicolau, Joseph L. Kuti*
- In Vivo* Pharmacodynamic Profile of Ceftibuten-Clavulanate Combination against Extended-Spectrum- $\beta$ -Lactamase-Producing *Enterobacteriaceae* in the Murine Thigh Infection Model** e00145-19  
*Kamilia Abdelraouf, Sean M. Stainton, David P. Nicolau*
- In Vivo* Efficacy of WCK 5222 (Cefepime-Zidebactam) against Multidrug-Resistant *Pseudomonas aeruginosa* in the Neutropenic Murine Thigh Infection Model** e00233-19  
*Marguerite L. Monogue, Jennifer Tabor-Rennie, Kamilia Abdelraouf, David P. Nicolau*
- Body Surface Area-Based Dosing Regimen of Caspofungin in Children: a Population Pharmacokinetics Confirmatory Study** e00248-19  
*Xin-Mei Yang, Stephanie Leroux, Thomas Storme, Dao-Lun Zhang, Tiphaine Adam de Beaumais, Hai-Yan Shi, Yi-Lei Yang, Xiao-Ling Wang, Wei Zhao, Evelyne Jacqz-Aigrain*
- Validation and Application of an HPLC-DAD Method for Routine Therapeutic Drug Monitoring of Ceftobiprole** e00515-19  
*Benjamin Lima, Sandra Bodeau, Marie-Charlotte Quinton, Cyril Leven, Anne-Sophie Lemaire-Hurtel, Youssef Bennis*
- Activity of Antibiotics against *Staphylococcus aureus* in an *In Vitro* Model of Biofilms in the Context of Cystic Fibrosis: Influence of the Culture Medium** e00602-19  
*Yvan Diaz Iglesias, Tobias Wilms, Rita Vanbever, Françoise Van Bambeke*
- Systematic Review of Host-Mediated Activity of Miltefosine in Leishmaniasis through Immunomodulation** e02507-18  
*Semra Palić, Patrick Bhairosing, Jos H. Beijnen, Thomas P. C. Dorlo*

**Preclinical Pharmacokinetic and Pharmacodynamic Data To Support Cefoxitin Nebulization for the Treatment of *Mycobacterium abscessus*** e02651-18

*Shachi Mehta, Vincent Aranzana-Climent, Blandine Rammaert, Nicolas Grégoire, Sandrine Marchand, William Couet, Julien M. Buyck*

**LETTER TO THE EDITOR**

**Plasmid Carrying *bla*<sub>CTX-M-2</sub> and *bla*<sub>GES-1</sub> in Extensively Drug-Resistant *Pseudomonas aeruginosa* from Cerebrospinal Fluid** e00186-19

*Anelise Stella Ballaben, Renata Galetti, Leonardo Neves Andrade, Joseane Cristina Ferreira, Doroti de Oliveira Garcia, Paulo da Silva, Yohei Doi, Ana Lucia Costa Darini*

**AUTHOR CORRECTION**

**Correction for Zhang et al., "Hepatotoxicity Induced by Isoniazid-Lipopolysaccharide through Endoplasmic Reticulum Stress, Autophagy, and Apoptosis Pathways in Zebrafish"** e00936-19

*Yun Zhang, Juan Cen, Zhili Jia, Chung-Der Hsiao, Qing Xia, Xue Wang, Xiqiang Chen, Rongchun Wang, Zhenzhou Jiang, Luyong Zhang, Kechun Liu*