OMICS Group Conferences
Accelerating Scientific Discovery
International Conference on
Omics Studies
September 4-6, 2013 Holiday Inn, Orlando-FL, USA

Translational and clinical pharmacogenetics: Converting science into better health

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Abstract

Current concepts in clinical drug therapy often attempt drug treatment of large patient populations as groups, irrespective of the potential for individual, genetically based differences in drug response. It is well recognized that most medications exhibit large inter-patient variability in their clearance, efficacy and toxicity. Pharmacogenetics is the study of how the genetic variations affect drug response in individual patients. The traditional pharmacogenetic approach relies on studying sequence variations in candidate genes that probably affect drug clearance and drug response. On the other hand, the advent of highly efficient and specific genomic technologies (e.g., GWAS) enables the search for relevant genes and their variants in the genome, and these new technologies have essentially spawned a new discipline, termed pharmacogenomics. Pharmacogenomics emphasizes the identification of the network of genes that govern drug response in individual patients using genome-wide approaches. Moreover, pharmacogenomic studies can identify disease susceptibility genes representing potential new drug targets. Numerous genes, in particular those encoding drug metabolizing enzymes, drug transporters and drug targets, have been identified to play a role in drug response and toxicity. All of this will lead to novel approaches in drug discovery, individualized dosing of medications, and new insights into disease susceptibility and prevention. In the past decade, my laboratory has investigated the impact of polymorphisms of a number of important genes including *CYP2B6*, *CYP2C9*, *ApoE*, *PXR/NR1I2*, *UGT1A1*, *GSTM1*, *GSTT1*, *GSTP1*,*TPMT*, etc. on drug clearance and response. Mutations of these genes can significantly alter drug clearance or response in different ethnic groups.I will also address the challenges we face and possible solutions in the routine use of pharmacogenomics in clinical settings.

Biography

Dr Zhou, MD/PhD, is presently a Professor of Pharmacology and Molecular Medicine, Associate Vice President of Global Medical Development, Associate Dean of International Research, and Chair of the Department of Pharmaceutical Sciences, Colleges of Pharmacy and Medicine, University of South Florida, Tampa, Florida. He has published more than 320 peer-reviewed papers in biomedical journals, which has been cited more than 7,500 times by colleagues with an H-index of 44. He is the editor or editor-in-chief of 7 medical journals and the editorial board member of other 25 medical journals. To date, he has trained 24 PhD students, 12 MSc/Honors students, 14 postdoctoral staff and 15 visiting doctors from other countries.