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Pharmacogenomics, point-of-care, and personalized medicine

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Abstract

Pharmacogenomics, the study of the influence of genetic factors on drug action and metabolism, is used for predicting drug efficacy and drug-induced adverse reactions. This knowledge on the effects of genetic polymorphisms is applicable in drug discovery and development as well as in the clinical use of drugs. Increases in efficacy and safety by the individualization of medical treatment may have benefits in financial terms, if information is presented to show that personalized medicine will be cost-effective in healthcare systems.

The rapid growth of personalized medicine is being supported by emerging new technologies together with accumulating knowledge of pharmacogenomics. Basic technologies of molecular diagnostics play a role in expanding pharmacogenomic information, particularly with respect to SNP genotyping. Diagnosis is thus integrated with therapy for selecting treatments as well for monitoring results. Cost-effective methods should be developed for genotyping, however, and it would be desirable to include this information in the patient's record as guidance for physicians to individualize the treatment. The accurate measurement of allele frequency variations among population groups with different sensitivities to diseases and/or different responses to drugs is fundamental to genetic epidemiology.

Development of personalized medicine, including point-of-care technology, requires the integration of various segments of biotechnology, clinical medicine, and pharmacology. Multiple players should be involved in the development of personalized therapy. In particular, pharmaceutical and biotechnology companies would take leading roles in this venture in keeping with their future roles as healthcare enterprises.

Biography

Dr. Toshihisa Ishikawa obtained his Ph.D. degree from the Graduate School of Science (Major: Biochemistry and Biophysics), Hokkaido University, Japan in March 1982. He performed research at Osaka University Medical School, University of Dusseldorf Medical School, German Cancer Research Center, University of Texas M.D. Anderson Cancer Center, and Pfizer Inc. Dr. Ishikawa was Professor at the Tokyo Institute of Technology (2000 - 2009), where he founded a bio-venture company of “MedicinalGenomix, Inc.”, currently named “Genomembrane”. In 2009, he moved to RIKEN Yokohama Institute and is presently Professor (adjunct) of Yokohama City University Graduate School of Medicine. He was a member of the International Nomenclature Committee for Human ABC Transporter Genes. He directed the NEDO project entitled “International standardization of *in-vitro* functional assay methods for human drug transporters” (2005 - 2008). He then served as a member of the Steering Committee of the FDA Critical Path Transporter Workshop (2008). Presently, Dr. Ishikawa is a member of the Emerging Issues Steering Committee of the ILSI Health and Environmental Sciences Institute (Washington DC, USA) and the International Transporter Consortium (ITC). Dr. Ishikawa has recently been elected as Chairman of the 2015 Gordon Research Conference on “Multi-Drug Efflux Systems.”

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