

Editorial: Pharmacogenetics

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Editorial

Adverse drug reactions are influenced by multiple factors, including health, environmental influences and genetic characteristics. Pharmacogenetics studies how inter-individual genetic variations may affect drug responses. It is the technology that researches the influence of genetic variation on drug response in patients by correlating gene expression or polymorphisms with a drug's efficacy or toxicity.

It is well known that Adverse Drug Reactions (ADRs) are a relevant health matter, being the fourth cause of demise in hospitalized patients. Important drug agencies have demonstrated a great interest in the early detection of ADRs due to their high incidence and increasing health care costs. Pharmacogenetics aims to develop the means to optimize drug therapy with respect to the patients' genotype, to ensure maximum efficacy with minimal adverse effects.

Many medications are metabolized by enzymes that have genetic polymorphisms, particularly the various cytochrome P450 isoforms. In this biotransformation process, drugs are converted to more soluble metabolites in water, facilitating their excretion. However, polymorphisms in the genes of the enzymes participating in the

metabolism process may affect the phase I reaction (oxidation, reduction and hydrolysis) and Phase II reactions (conjugation reactions, acetylation, glucuronidation, sulfation and methylation), increasing or reducing the susceptibility of individuals to the adverse effects of the drugs.

For example, the interindividual response to therapy and slope of disease progression varies markedly among patients with type 2 diabetes. Gene-gene, gene-environment, and gene-treatment interactions may explain some of the variation in disease progression. Studies suggest that genetic polymorphisms of drug metabolizing enzymes, transporters and receptors contribute to variations in responses to drugs.

Pharmacogenetics is a research field still in development and therapy individualization remain a challenge for the future. It is important to appreciate that many genes may influence the response to drugs, and the genetic polymorphisms present ethnic variation, which complicates the identification of genetic variations which are most relevant. Clinical validation of genetic markers of the greatest clinical relevance is perhaps one of the major limiting factors in the use of genetic information when making treatment decisions.