How can Pharmacogenomics enhance the effectiveness of Medications?

Priyanka R*
Department of Pharmaceutical Analysis, MGR Medical University, Chennai, India

Commentary

Received: 06/05/2015
Accepted: 09/05/2015
Published: 25/05/2015

*For Correspondence: Priyanka R
Department of Pharmaceutical Analysis, MGR Medical University, Chennai, India,
E-mail: priyanka_r@omicsgroup.co.in

Keywords: Pharmacogenomics, pharmacokinetics, Genetics, Personalized Medicine

Commentary

How can Pharmacogenomics enhance the effectiveness of Medications?

In pharmacogenomics, genomic information is used to study individual responses to Medication. Once a gene variant is related to a specific drug response in a patient, there is the potential for making clinical decisions based on genetics by adjusting the dosage or choosing a different drug, for example. Scientists assess gene variants affecting an individual's drug response the same way they assess gene variants associated with diseases: by identifying genetic loci associated with known drug responses, and then testing individuals whose response is unknown [1-3]. Modern approaches include multigene analysis or whole-genome single nucleotide polymorphism (SNP) profiles, and these approaches are coming under clinical use for drug discovery and drug development [2-5].

Genetic Polymorphism plays major role in Pharmacogenomics based on the Pharmacokinetic and Pharmacodynamic study of drug in body [6]. Pharmacokinetics explains about the absorption, distribution, metabolism and excretion of drug in the body that is what the body does to the drug [6-9]. Pharmacodynamics explains about Receptors, Ion channels, Enzymes and immune system that is what the drug does to the body [10].

Pharmacogenomics holds the promise of transforming patient care by allowing providers to tailor therapy to each individual patient based on his or her genetic information. Genetics may account for much of the variability in our patient’s responses to drug therapies. In many patients, certain drugs do not work as well as expected, whereas in other patients they cause toxic effects, even at lower doses [11-14]. For some patients, the reason may be genetic. Pharmacogenomics is the study of how genetic factors relate to interindividual variability of drug response.

Pharmacogenetics dealing with inherited differences in drug targets and drug disposition in the form of drug receptors and drug transporters is rapidly developing [15]. The notion of personalized medicine has developed from the application of the discipline of Pharmacogenetics to clinical medicine [16].

Clinical study of genetically determined inter-individual variations in pharmacokinetics is poorly explained, and also the genotype-phenotype association information on clinical outcomes is usually...
variable [17]. The approved drug labels regularly include pharmacogenetic data regarding the safety and efficacy of various types of drugs and refer to the availability of the pharmacogenetic test concerned [18].

Pharmacogenetics is the branch of pharmacology and its principles are applied to clinical drugs to develop the view of personalized medicine [19].

Pharmacogenomics (PGx) and pharmacogenetics (PGt) are emerging multidisciplinary field recently specified by the regulatory authorities at an international level as 'the investigation of alteration of DNA and RNA characteristics as associated with drug response' (PGx), and also the study of the impact of variations in DNA sequence on drug efficacy and toxicity' (PGt) [20,7,9]. Variety of studies composed growing evidence that, besides the effects of age, sex, diseases, and various drug interactions, genetic factors play major role within the inter-individual variability of medicines response. The increasing genomic data has additionally raised the profile and role of the Genomic biomarkers (GBs) in drug development, approval, and clinical use.

Clinical trials must be designed properly to determine individual as well as population variations [21]. The effect of non-genetic and environmental factors, epigenetic variations and circadian rhythms on an every patient response need to be evaluated to make pharmacogenomics clinically indicated. Pharmacogenomics can play critical part in diagnose responders and non-responders to drugs, avoiding adverse events, and optimizing drug dose [22]. Drug labeling may contain detailed information on genomic biomarkers and can describe:

- Drug exposure and clinical response variability
- Risk for adverse events
- Genotype-specific dosing
- Mechanisms of drug action
- Polymorphic drug target and disposition genes

Acknowledgement

I would like to acknowledge the support of my colleagues Rakesh M, Sateesh V, Vishal T in assisting with proper guidance. This content is reviewed and approved by Murali M.

References


