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How can Pharmacogenomics enhance the effectiveness of Medications?

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Commentary

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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 comes 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 a 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

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References
1. Kurylowicz A. Stimulation of Thermogenesis via Beta-Adrenergic and Thyroid Hormone Receptors Agonists in Obesity Treatment – Possible Reasons for Therapy Resistance. J Pharmacogenomics Pharmacoproteomics. 2015; 6: 145.

2. Borges JB, Hirata TDC, Cerda A, Fajardo CM, Cesar RCC,et al. Polymorphisms in Genes Encoding Metalloproteinase 9 and Lymphotoxin-Alpha can Influence Warfarin Treatment. J Pharmacogenomics Pharmacoproteomics. 2015; 6: 143.

3. Siest G. The European Society of Pharmacogenomics and Personalised Therapy -"ESPT. J Pharmacogenomics Pharmacoproteomics. 2015; 6: 144.

4. Mahajan PB. Will Pharmacogenomics Take the Pain Out of Pain Medication?. J Pharmacogenomics Pharmacoproteomics. 2014; 6: e142.

5. Lu X, Chan T, Xu C, Ng WV, Zhu L. The Interactions of Herbal Compounds with Human Organic Anion/Cation Transporters. J Pharmacogenomics Pharmacoproteomics. 2014; 5: 142.

6. Duconge J. Population Heterogeneity and Genomic Admixture: Relevance for Global Pharmacogenetics. J Pharmacogenomics Pharmacoproteomics. 2014; 5: e141.

7. Krynetskiy E. Pharmacogenomics of Simple Repeats: How Do You Solve a Problem like VNSR?. J Pharmacogenomics Pharmacoproteomics. 2014; 5: e139.

8. Daoud SS. Genome Wide Identification of FGFR2 Alternative Splicing in Hepatitis C: Potential Roles in Malignant ransformation. J Pharmacogenomics Pharmacoproteomics. 2014; 5: e140.

9. Feng X, Mello RL, Listiawan M, Quadro R. Future Medicine for Today's Cancer Patients: Therapeutic Application of Pharmacogenomics in Oncology. J Pharma Care Health Sys. 2014; 1: 119.

10. Komaravelli N, Casola A. Respiratory Viral Infections and Subversion of Cellular Antioxidant Defenses. J Pharmacogenomics Pharmacoproteomics. 2014; 5: 141.

11. Saadi T, Kramskay R, Peled BZ, Katz K, Peled N, et al. Pharmacokinetics and Safety of Sublingual Flumazenil (CRLS035) in Healthy Adults (Potential Therapy for Hepatic Encephalopathy). J Pharmacogenomics Pharmacoproteomics. 2014; 5: 140.

12. Ghoraba DA, Mohammed MM, Zaki OK. Mutation Analysis of Methylmalonyl CoA Mutase Gene Exon 2 in Egyptian Families: Identification of 25 Novel Allelic Variants. J Pharmacogenomics Pharmacoproteomics. 2014; 5:139.

13. Cacabelos R. The Pathogenic Component of the APOE-TOMM40 Region in Alzheimer's disease: Its Implications in Metabolomics and Pharmacogenomics. Metabolomics. 2014; 4: 1000e129.

14. Zdanowicz MM, Adams PW. The Pharmacogenetics of Nicotine Dependence and Smoking Cessation Therapies. J Pharmacogenomics Pharmacoproteomics. 2014; 5: 138.

15. Alskaf E, Ahmed S, Barnett D, Warriner M, Birchall A, et al. What is the Logic behind Treating Some Heart Failure Patients without ACE Inhibitors and Beta-Blockers?. J Pharmacogenomics Pharmacoproteomics. 2014; 5: 137.

16. Mirzaev K, Sychev D, Arutyunyan G, Yugay A, Andreev D. Cytochrome 2C19 Enzyme Polymorphism Frequency in Different Indigenous Ethnic Groups in Russian Federation: A Systematic Review. J Pharmacogenomics Pharmacoproteomics. 2014; 5: 136.

17. Prasanthi SV, Jamdade VS, Bolshette NB, Gogoi R, Lahkar M. Pharmacogenomics Study of Clopidogrel by RFLP based Genotyping of CYP2C19 in Cardiovascular Disease Patients in North-East Population of India. J Pharmacogenomics Pharmacoproteomics. 2014; 5: 132.

18. Hartshorne T, Le F, Lang J, Leong H, Hayashibara K, et al. A High-throughput Real-time PCR Approach to Pharmacogenomics Studies. J Pharmacogenomics Pharmacoproteomics. 2014; 5:133.

19. Clive E Bowman. Why Single Pharmacogenomic Trials Should be Very Significant?. J Pharmacogenomics Pharmacoproteomics. 2014; 5: e138.

20. Alves C, Felipe CR, Nishikawa AM, Salgado PC, Fajardo C, et al. Influence of SLCO1B1 and SLCO2B1 Polymorphisms on Tacrolimus Pharmacokinetics and Clinical Response. J Pharmacogenomics Pharmacoproteomics. 2014; 5: 134.

21. Iskakova AN, Romanova Voronina AA, Voronina EN, Sikhayeva NS, Belozerceva AB, et al. Allele Frequency and Genotype Distribution of 9 SNPs in the Kazakh Population. J Pharmacogenomics Pharmacoproteomics. 2014; 5: 129.

22. Torrellas C, Carril JC, Cacabelos R. Benefits of Pharmacogenetics in the Management of Hypertension. J Pharmacogenomics Pharmacoproteomics. 2014; 5: 126.