World Academy of Science, Engineering and Technology
International Journal of Bioengineering and Life Sciences
Vol:9, No:02, 2015

Prevalence of Cyp2d6 and Its Implications for Personalized Medicine in Saudi Arabs

Authors : Hamsa T. Tayeb, Mohammad A. Arafah, Dana M. Bakheet, Duaa M. Khalaf, Agnieszka Tarnoska, Nduna Dzimiri

Abstract : Background: CYP2D6 is a member of the cytochrome P450 mixed-function oxidase system. The enzyme is responsible for the metabolism and elimination of approximately 25% of clinically used drugs, especially in breast cancer and psychiatric therapy. Different phenotypes have been described displaying alleles that lead to a complete loss of enzyme activity, reduced function (poor metabolizers – PM), hyperfunctionality (ultrarapid metabolizers–UM) and therefore drug intoxication or loss of drug effect. The prevalence of these variants may vary among different ethnic groups. Furthermore, the xTAG system has been developed to categorized all patients into different groups based on their CYP2D6 substrate metabolization. Aim of the study: To determine the prevalence of the different CYP2D6 variants in our population, and to evaluate their clinical relevance in personalized medicine. Methodology: We used the Luminex xMAP genotyping system to sequence 305 Saudi individuals visiting the Blood Bank of our Institution and determine which polymorphisms of CYP2D6 gene are prevalent in our region. Results: xTAG genotyping showed that 36.72% (112 out of 305 individuals) carried the CYP2D6_*2. Out of the 112 individuals with the *2 SNP, 6.23% had multiple copies of *2 SNP (19 individuals out of 305 individuals), resulting in an UM phenotype. About 33.44% carried the CYP2D6_*41, which leads to decreased activity of the CYP2D6 enzyme. 19.67% had the wild-type alleles and thus had normal enzyme function. Furthermore, 15.74% carried the CYP2D6_*4, which is the most common nonfunctional form of the CYP2D6 enzyme worldwide. 6.56% carried the CYP2D6_*17, resulting in decreased enzyme activity. Approximately 5.73% carried the CYP2D6_*10, consequently decreasing the enzyme activity, resulting in a PM phenotype. 2.30% carried the CYP2D6_*29, leading to decreased metabolic activity of the enzyme, and 2.30% carried the CYP2D6_*35, resulting in an UM phenotype, 1.64% had a whole-gene deletion CYP2D6_*5, thus resulting in the loss of CYP2D6 enzyme production, 0.66% carried the CYP2D6_*6 variant. One individual carried the CYP2D6_*3(B), producing an inactive form of the enzyme, which leads to decrease of enzyme activity, resulting in a PM phenotype. Finally, one individual carried the CYP2D6_*9, which decreases the enzyme activity. Conclusions: Our study demonstrates that different CYP2D6 variants are highly prevalent in ethnic Saudi Arabs. This finding sets a basis for informed genotyping for these variants in personalized medicine. The study also suggests that xTAG is an appropriate procedure for genotyping the CYP2D6 variants in personalized medicine.

Keywords : CYP2D6, hormonal breast cancer, pharmacogenetics, polymorphism, psychiatric treatment, Saudi population
Conference Title : ICHG 2015 : International Conference on Human Genetics
Conference Location : London, United Kingdom
Conference Dates : February 16-17, 2015