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Genetic variation of Organic Anion Transporter Polypeptide 1B1 (OATP1B1) and Breast Cancer Resistance Protein (BCRP) transporter genes in African populations – implication for the safe and efficacious use of statins

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Abstract

Statins are recommended by the World Health Organisation in the treatment of patients with well established cardiovascular diseases. The global incidence of cardiovascular diseases is rising and this group of diseases is now the second cause of death annually. However, genetic polymorphisms involving drug transporters have been shown to have significant impact on statin pharmacokinetics thus affecting their safe and efficacious use in patients. Of particular emphasis is the single nucleotide polymorphism c.521T>C in the SLCO1B1 gene that encodes the organic anion transporter polypeptide 1B1 and the single nucleotide polymorphism c.421C>A in the ABCG2 gene that encodes breast cancer resistance protein. These two polymorphisms have been associated with reduced transporter activity resulting in statin induced myopathy. The aim of this study was to determine the frequency of these two polymorphisms in African populations. Data on the effect of these polymorphisms on the pharmacokinetics of statins is emerging but such information amongst African populations is still not available. The SLCO1B1 c.521T>C (rs number 4149056) and ABCG2 c.421 C>A (rs number 2231142) were genotyped in selected African ethnic groups. The selected ethnic groups were the Hausa, Igbo, Yoruba, Kikuyu, Maasai, Luo, Shona, San and the Tanzanina Bantu. Genotyping was achieved using TaqMan ® SNP Genotyping assay kits (Applied Biosystems) in a real time 7500 and 7500 Fast system (Applied Biosystems). The frequency of the SLCO1B1 c. 521CC genotype was 0.0% amongst all populations studied whilst that of SLCO1B1 c.521TC ranged from 0.0% in the San to 13% in the Maasai. The ABCG2 c.421AA frequency in the populations studied was 0.0% whereas that of the ABCG2 c.421CA genotype ranged from 0.0% to 1.0%. In conclusion, the African populations studied had a high frequency of the SLCO1B1 c. 521TT (98%) and the ABCG2 c.421CC (99%) which are associated with a satisfactory tolerance of the currently prescribed statin doses. However, studies need to be conducted in a clinical setting to ensure safe and efficacious use of statins.