Pharmacogenomic Analysis of Korean Patients with Cognitive Impairment and Dementia

Soo-Yeon Park[1], Sook-Young Kim[1], Jin-Hwa Kong[2], Seul Gi Kim[2], Sang Cheol Kim[2], Je-Gun Joung[1,*]

[1]*Department of Biomedical Science, College of Life Science, CHA University*
[2]*Division of Healthcare and Artificial Intelligence, Department of Precision Medicine, National Institute of Health, KDCPA*
Corresponding author: jgjoung@cha.ac.kr

Pharmacogenomics aims to achieve precision medicine by analyzing an individual's genomic information to minimize drug side effects and enable personalized drug prescriptions. The realization of precision medicine is essential for reducing medical costs and efficiently managing symptoms such as dementia and concomitant diseases. In this study, we conducted genotyping, variant annotation, and clinical annotation processes for 470 patients with cognitive impairment, 144 Alzheimer's disease (AD), and 60 vascular dementia (VaD) in Korea. To perform pharmacogenomic (PGx) analysis, we examined the phenotypes and genotypes associated with rosuvastatin and atorvastatin in each patient group. Additionally, we compared the frequency differences in decreased and increased phenotypes among the patient groups using Odds Ratio. In the case of the Atorvastatin Efficacy Increased phenotype, the proportion was significantly higher in Alzheimer's patients compared to those with cognitive impairment and vascular dementia (cognitive impairment Fisher exact P=0.0014, vascular dementia Fisher exact P=0.0143). When in the increased state, the genotype(rs7412) is mostly estimated as C/T, while in the decreased state, it is estimated as C/C. For the rosuvastatin Efficacy Increased phenotype, the proportion was higher in patients with cognitive impairment and Alzheimer's disease compared to those with vascular dementia. Specifically, there was a significant difference between patients with cognitive impairment and vascular dementia (Fisher exact P=0.0404). In the increased state, the genotype(rs2231142) is estimated as G/G, whereas in the decreased state, it is estimated as G/T or T/T. We compared the effects of atorvastatin and rosuvastatin medications in Korean patients with cognitive impairment, Alzheimer's disease, and vascular dementia. We observed differences in drug efficacy within the same dementia patient group due to variations in the underlying causes and symptoms. Considering these pharmacogenomic differences, it is suggested that customizing prescriptions for individual patients by adjusting drug dosages can be beneficial.