Functional polymorphisms of the glutamate receptor N-methyl D-aspartate 2A gene are associated with heroin addiction

H.J. Zhong¹², Z.H. Huo¹², J. Dang¹, J. Chen¹, Y.S. Zhu¹ and J.H. Liu³

¹Key Laboratory of Fertility Preservation and Maintenance, Ningxia Medical University, Ministry of Education, Yinchuan, China
²Department of Medical Genetics and Cell Biology, Ningxia Medical University, Yinchuan, China
³Physiology, School of Life Science, Ningxia University, Yinchuan, China

Corresponding author: J.H. Liu
E-mail: aiwapeter@163.com

Received September 17, 2013
Accepted February 6, 2014
Published October 27, 2014
DOI http://dx.doi.org/10.4238/2014.October.27.12

ABSTRACT. Heroin dependence is a debilitating psychiatric disorder with a complex inheritance mechanism. Genetic polymorphisms in functional regions of the glutamate receptor, N-methyl D-aspartate 2A (GRIN2A) gene, which encodes the 2A subunit of the N-methyl D-aspartate (NMDA) receptor, may modulate the risk of heroin addiction. We investigated the potential association between 8 single nucleotide polymorphisms (SNPs) of the GRIN2A gene (SNPs rs3219790, rs1014531, rs8044472, rs8045712, rs9933624, rs9940680, rs1420040, and rs767749) and heroin addiction using the MassARRAY system and GeneScan. A total of 405 heroin-addicted patients and 397 healthy control subjects were recruited for this study. Statistically significant differences were observed for rs3219790 in the promoter region of the GRIN2A gene. The frequency of the (GT)26 repeats in the heroin addiction group was significantly higher than that in the control group [χ² = 5.475, P = 0.019, odds ratio (OR) = 1.367, 95% confidence
interval (CI) = 1.051-1.776]. Strong linkage disequilibrium was observed in block 1 (D’ > 0.9). However, significant evidence of linkage disequilibrium was not observed between the 7 SNPs in our sample population. These data suggest that GRIN2A gene polymorphisms confer susceptibility to heroin addiction and support the hypothesis that dysfunction of GRIN2A is involved in the pathophysiological process of heroin addiction.

**Key words:** Heroin addiction; Glutamate receptor; Ionotropic; N-methyl D-aspartate 2A; Polymorphisms