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» Journal Abstract

GSTP1, GSTM1, and GSTT1 polymorphisms in Tibetan mountaineers

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Exposure to high altitude can increase the level of reactive oxygen species (ROS) in human beings. Physical exercises or working can exacerbate the effects of high altitude and further cause free radical mediated oxidative tissue injury. The glutathione S-transferases (GSTs) can scavenge ROS. Variant genotypes of GSTs lead to the inactive or decreased form of the enzymes. We hypothesized that the polymorphisms within these genes may explain the interindividual variation in response to high altitude hypoxia. We have evaluated the polymorphisms of GSTP1, GSTM1 and GSTT1 genes in 86 excellent Tibetan mountaineers and in 90 sea-level Han Chinese were used as the control group. Polymerase chain reaction (PCR) and restriction fragment length polymorphism (RFLP) were performed to genotype GSTP1 polymorphism in exon 5 (Ile105Val). Both GSTM1 and GSTT1 genotypes were determined by multiplex PCR. The result showed that GSTM1 null genotype was found in 60.5% of Tibetan mountaineers and in 54.4% of sea-level Han Chinese. No difference was observed in the frequency of polymorphic genotype for GSTM1 (×2=0.65, p=0.26), (OR=0.78; 95% CI:0.43-1.42). The frequency of GSTT1 null genotype was 36.1% among Tibetan mountaineers, 51.1% among Han Chinese. The difference was statistically significant (×2=4.06, p=0.031), (OR=1.86; 95% CI: 1.01-3.39). The proportion of GSTP1-105 mutant homozygote was significantly lower in the Tibetan mountaineers than in the control subjects (26.7% vs 44.4%) (×2=5.99, p=0.011).The OR for GSTP1-105 mutant genotype versus wild genotype was 2.19 (95% CI=1.16-4.13). These results suggest that GSTT1 and GSTP1-105 genotypes may be associated with the interindividual variation in response to high altitude hypoxia, and may be two new markers in gene screening for human adaptation to high altitude.

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