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Influences of ACE I/D and ACTN3 R577X polymorphisms in elite female soccer athletes

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Objective The performance phenotype is regulated by polygenes. There were few reports about the cumulative effect of the I/D polymorphism in the angiotensin I-converting enzyme (ACE) gene and ACTN3 in athletes. This study was to investigate the association of ACE I/D and ACTN3 R577X polymorphisms with the performance of Chinese elite female soccer athletes for the first time.

Methods The genotype distributions of ACE I/D and ACTN3 R577X in the athlete group (N=92) and the control group of Chinese females (N=200) were evaluated via PCR and compared.

Results Regarding the distribution of ACE polymorphisms, the genotype frequency was indifferent between the athletes (II 40.2%, ID 46.7%, DD 13.1%) and the controls (II 42%, ID 48%, DD 10%) based on the chi-square test. No difference in the I/D allele frequency was observed between the athlete group (I allele: 59.25%; D allele: 40.75%) and the control group (I allele: 60.8%; D allele: 39.2%). Regarding the distribution of ACTN3 polymorphisms, the genotype frequency was significantly different between the athletes (XX 0%, XR 53.3%, RR 46.7%) and the controls (XX 16%, XR 44%, RR 40%). The allele frequency was observed no different between the athlete and the control group (X allele: 34.8%/41.7%; R allele: 65.2%/58.3%, respectively). The ACE and ACTN3 genotype combinations (II/ID/DD+RR/XR) significantly differed between the athletes and the controls by χ^2 test ($p < 0.05$).

Conclusions These results suggested that the Chinese elite female soccer athletes were more likely to harbor the I allele and the R allele and that the combination of ACE II/ID and ACTN3 RR/XR was a synergetic determinant of the athletic performance of females in soccer.