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MSTN gene polymorphism influence on WBV-induced changes on body composition in Chinese postmenopausal women

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Objective To explore the association between MSTN rs3791783 polymorphism and body composition response to 3-month whole body vibration (WBV) intervention in postmenopausal women and to probe into the molecular regulatory mechanisms behind it.

Methods A total of 90 postmenopausal women participated in the study, and 30 of them served as non-trained control group, 60 of them trained on a vibration platform for 3 months. Body composition included FM% (percentage of fat mass) and LM% were assessed by dual-energy X-ray absorptiometry at the baseline and 3 months. The rs3791783 polymorphism was genotyped by PCR-restriction fragment length polymorphism, and association analysis with the body composition changes induced-by WBV training was performed. The regulatory mechanisms of the rs3791783 polymorphism were explored through the dual-luciferase reporter assay.

Results In the WBV group, LM% significant increased through 3-month WBV training (60.87 ± 5.35 , 61.63 ± 5.05 , $P < 0.05$), meanwhile, FM% significant decreased (35.65 ± 5.47 , 34.86 ± 5.16 , $P < 0.05$). In the CON group, no significant difference within group was detected in LM% and FM%, and significant group by time interactions were found in LM% and FM% ($P < 0.05$). The subjects with an AA allele had significantly greater increase in LM% (60.27 ± 5.28 , 61.42 ± 4.93 , $P < 0.01$) and decreases in FM% (36.35 ± 5.35 , 35.18 ± 4.99 , $P < 0.01$) than those with GA allele (61.97 ± 5.72 , 62.13 ± 5.59 , $P > 0.05$; 34.38 ± 5.90 , 34.19 ± 5.79 , $P > 0.05$). The relative luciferase activity of the reporter gene in recombinant vector carrying the A allele was 3.302 ± 1.121 , markedly higher than that in recombinant vector carrying the G allele (1.760 ± 0.920 , $p < 0.05$).

Conclusions Three-month WBV training is beneficial for body composition among postmenopausal women and the individual with AA genotype of the rs3791783 polymorphism were more sensitive to WBV-induced body composition changes. The A allele can improve reporter gene expression level, indicating the effects of rs3791783 on gene expression.