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

Xiaohong Chen¹, Yang Hu²
1. Capital University of Physical Education and Sports
2. Sport Science Research Center of Beijing Sport University

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.