



## Exercise Biochemistry Review

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Proceedings of IBEC 2018, Beijing, China, October 23-25  
PO-046

### Gene expression profiling of peripheral blood mononuclear cells in young male trampoline athletes

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**Objective** Evidence indicates that physical activity influence bone health. However, the molecular mechanisms mediating the beneficial adaptations to exercise are not well understood. The purpose of this study was to examine the differentially expressed genes in PBMC between athletes and healthy controls, and to analyze the important functional genes and signal pathways that cause increased bone mineral density in athletes, in order to further reveal the molecular mechanisms of exercise promoting bone health.

**Methods** Five professional trampoline athletes and five age-matched untrained college students participated in this study. Used the human expression Microarray V4.0 expression profiling chip to detect differentially expressed genes in the two groups, and performed KEGG Pathway analysis and application of STRING database to construct protein interaction Network; Real-Time PCR technology was used to verify the expression of some differential genes.

**Results** Compared with healthy controls, there were significant improvement in lumbar spine bone mineral density, and 236 up-regulated as well as 265 down-regulated in serum samples of athletes. The differentially expressed genes involved 28 signal pathways, such as cell adhesion molecules. Protein interaction network showed that MYC was at the core node position. Real-time PCR results showed that the expression levels of CD40 and ITG $\alpha$ 6 genes in the athletes were up-regulated compared with the healthy controls, the detection results were consistent with that of the gene chip.

**Conclusions** The findings highlight that long-term high-intensity trampoline training could induce transcriptional changes in PBMC of the athletes. These data suggest that gene expression fingerprints can serve as a powerful research tool to design novel strategies for monitoring exercise. The findings of the study also provide support for the notion that PBMC could be used as a substitute to study exercise training that affects bone health.