

スポーツ科学研究, 11, 69-130, 2014 年

## **Establishment of cell culture system for analysis of exercise-induced immunoregulation**

Yung-Li Hung<sup>1</sup>, Katsuhiko Suzuki<sup>2</sup>

<sup>1</sup>Graduate School of Sport Sciences, Waseda University

<sup>2</sup>Faculty of Sport Sciences, Waseda University

Innate immune responses are involved in the development of several chronic diseases, including atherosclerosis, diabetes and cancer. Indeed, the inflammatory responses of macrophages via activation of Toll-like receptor 4 play an important role in innate immune responses on pathogenesis of chronic diseases. On the other hand, exercise training suppresses production of pro-inflammatory cytokines and down-regulates Toll-like receptor 4. The several bioactive substances such as stress hormones (catecholamines and glucocorticoids) and cytokines are induced during exercise, and are involved in the exercise-induced immunoregulation. It has been found the stress hormones contribute to the anti-inflammatory effects of exercise. However, the mechanisms of stress hormone on the exercise induced immunoregulation are not well understood. Especially, the effects of stress hormones on Toll-like receptor 4 signaling pathway of macrophages

are still unclear.

To investigate the Toll-like receptor 4 signaling pathway of macrophages, macrophage's cell line RAW cells were stimulated by lipopolysaccharide (LPS). Also, to investigate the anti-inflammatory effects of stress hormones, LPS-stimulated RAW cells were treated with Adrenaline, Noradrenaline and Dexamethasone. After 24-hour incubation, cell supernatant was harvested for measurement of pro-inflammatory cytokine production (IL-6 and TNF- $\alpha$ ) by enzyme-linked immunosorbent assay (ELISA). The production of IL-6 and TNF- $\alpha$  induced by LPS were significantly inhibited by treatment with Adrenaline, Noradrenaline and Dexamethasone.

To investigate the Toll-like receptor 4 signaling pathway, proteins of Toll-like receptor 4 will be detected by Western blotting analysis. In this symposium, we will report the results of proteins of Toll-like receptor 4.