

## Neutrophil functional changes following exercise and the biological significance

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### Abstract

Neutrophils not only play a critical role in host defense by migrating to the site of infection and producing reactive oxygen species (ROS), but also by mediating pathological processes in acute inflammatory tissue damage. The overproduction of ROS by neutrophils leads to oxidative stress. We reported that exhaustive exercise facilitated neutrophil activity (Suzuki et al., 1996) which might be associated with muscle damage (Suzuki et al., 1999), but antioxidant capacity was also activated following exercise (Suzuki et al., 2003). Since antioxidants are considered as one of the countermeasures against oxidative stress, it was necessary to develop the assessment methodology which is closer to *in vivo* conditions. So, we developed a neutrophil activity measurement system that analyzes the migratory activity of neutrophils and their overproduction of ROS. That is, the mixture of blood and luminol was layered on modified Mebiol Gel<sup>®</sup> (hydrogel) in each tube, and ROS was detected by chemiluminescence, whereas the cell count in the hydrogel was quantified as migratory activity of neutrophils (Suzuki et al., 2012). We could demonstrate that muscle-damaging eccentric exercise caused neutrophil mobilization and activation in the absence of changes among many cytokine and inflammatory markers (Kanda et al., 2013) and that enhanced neutrophil activities after intensive endurance exercise were associated with muscle and renal damage (Sugama et al., 2015). On the other hand, many antioxidants were screened *in vitro* for applications to exercise-induced oxidative stress, and curcumin had the most potent inhibitory actions on neutrophil migration and ROS production among the tested antioxidants (Suzuki et al., 2012).

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