Cardiac rehabilitation (CR) is a multidisciplinary secondary prevention modality. Importantly, the effectiveness of CR on ischemic heart disease has already been confirmed by previous studies. The mechanism of the beneficial effects of CR is derived from improvements in the lipid profiles, glucose metabolism, and autonomic nervous system and endothelial function. These effects are considered to be derived partly from the secretion of myokines such as interleukin (IL)-6 from the exercised muscle, resulting in the suppression of an inflammatory reaction and oxidative stress.

In the current issue, Nishitani-Yokoyama investigated the effects of CR on the regression of plaque burden in coronary arteries. The study could not demonstrate a significant reduction of coronary plaques in subjects with PII-CR compared with those with non-PII-CR, possibly because of the small sample size or the insufficient frequencies of exercise in the group with PII-CR. However, this study also included other findings that may have a significant impact on the performance of CR. Compositional changes such as the improvement of body mass index (BMI), waist circumference, hip circumference, and muscle strength in the PII-CR group could not lead to sufficient anti-atherogenic effects, resulting in plaque regression. On the other hand, the study demonstrated a close correlation between the percent change in plaque volume and daily physical activity, which is a most novel finding.

Recently, a correlation between a decrease in physical activity and the progression of atherosclerosis has been reported. Delaney, et al demonstrated an association between physical activity and coronary artery calcification or ankle brachial index progression. Khoudary, et al also revealed that poor physical activity performance correlated with vascular structural change. Compared with these similar results, the findings of the current study are most meaningful in the clinical setting because plaque volume reduction is considered to be most influential to clinical outcome.

The mechanisms of the correlation between a decrease in physical activity and the progression of atherosclerosis were investigated in several reports. Physical activity affected the behavior of cytokines, chemokines, and adhesion molecules. Schumacher, et al reported that physical performance is inversely correlated with the levels of pro-inflammatory markers such as C-reactive protein (CRP) and IL-6 in patients with coronary heart disease, possibly retarding the process of atherosclerosis. Likewise, the increase of physical activity leads to the improvement of vascular endothelial function. These findings confirm that increased physical activity is beneficial for reducing the risk of atherosclerosis.

The current study used pedometer step counts, which are easy to assess and appropriate for self-monitoring among the several methods for quantifying physical activity. The validation of the pedometer step count indicating the value of physical activity was verified in several studies. Furthermore, the pedometer step count can predict exercise tolerance and correlate with several vascular or metabolic markers. Although the importance of the pedometer step count in evaluating the effectiveness of CR or monitoring the state of exercise tolerance should be addressed in future research, this simple parameter may be useful for predicting the future risk of atherosclerotic disease.

Indeed, CR was reported to increase the level of physical activity, which is also verified by the current study. The reason is that pedometer step count is a useful barometer with general availability, and it also helps to enhance physical activity as a motivational tool. As a result, its use leads to enhancement of the effects of CR. The contribution of physical activity in the effects of CR has not been clarified yet, however, the beneficial effects of CR may be partly derived from increased physical activity. Therefore, increased emphasis on maintaining physical activity during CR may further reduce the cardiovascular risk.

**Disclosure**

**Conflicts of interest:** The authors declare there are no conflicts of interest.
Figure. The relationship between physical activity and cardiac rehabilitation.

REFERENCES


