The Benefits of Exercise for Arterial Stiffness

Isabel Ferreira, Colin A. Boreham, and Coen D.A. Stehouwer

Reviewed Critique

Exercise training interventions that decrease arterial stiffness compared with their sedentary counterparts.3,4 Exercise training interventions that decrease the age-related increase in arterial stiffness may therefore have the potential to improve outcomes, particularly in individuals with increased cardiovascular risk. However, this may not apply to all risk groups. Indeed, exercise training has failed to exert any beneficial impact in patients with isolated systolic hypertension, which has been attributed to an irreversible level of arterial stiffening in these patients.1,2 Aerobic exercise training may thus be more effective when initiated early, as a preventive rather than a treatment measure.

In the current issue of the Journal, Sugawara et al5 report exercise-related improvements in arterial stiffness in postmenopausal women enrolled in an aerobic exercise program for 12 weeks. This specific risk group has been examined in an earlier exercise intervention study aiming at arterial stiffness reduction.6 The considerable improvements in arterial stiffness of that study led the authors to propose exercise as a strategy for decreasing cardiovascular disease risk in postmenopausal women. This hypothesis was further investigated by Sugawara et al, who also attempted to investigate whether aerobic exercise performed at different intensities (moderate or vigorous) would have a different impact on arterial stiffness. They found that both moderate and vigorous physical activity led to comparable reductions in arterial stiffness. These findings have important implications because moderate physical activity intensity may be more palatable and easily incorporated into daily life. One should nevertheless note that the exercise volume (ie, duration × intensity) undertaken by both exercise groups was the same (~900 kcal/week), suggesting that an energy expenditure threshold may be needed, through either short periods of vigorous exercise or longer periods of moderate exercise, to be reflected in arterial stiffness improvements.

The mechanisms by which exercise affects arterial properties have been poorly studied in human beings. Aerobic exercise is known to improve most of the classical risk factors (eg, body fatness, insulin resistance, blood pressure), which in turn are associated with increased arterial stiffness.7 The current study, as have others, suggests the impact of aerobic exercise on arterial stiffness to be at least partially independent of such other risk factors, although this was not exhaustively examined. In addition exercise has been shown to have an impact on endothelial function, inflammation, and sympathetic activity, all of which are known to affect arterial stiffness. Therefore it is conceivable that exercise-related improvements in arterial stiffness could be mediated by concomitant improvements in these functional pathways. Structural adaptations to exercise, such as increased elastin content and inhibition of collagen activity within the arterial wall, may also be involved; but they probably require the passage of longer periods of time and therefore are less likely to occur in the short term (ie, within weeks) covered by most intervention studies.1,2

In conclusion, unequivocal mechanistic data linking exercise to improvements in arterial stiffness are so far lacking, and control trials that investigate the mechanisms through which exercise improves arterial stiffness are needed. Nonetheless, and from a prevention viewpoint, the multiple benefits of exercise make it perhaps the “best buy” in cardiovascular disease prevention.

References


Received April 21, 2006. First decision April 21, 2006. Accepted April 29, 2006.

From the Departments of Clinical Epidemiology and Medical Technology Assessment and Internal Medicine, Academic Hospital Maastricht, Maastricht, the Netherlands; and the Institute for Sport and Health, University College, Dublin, Ireland.

Address correspondence and reprint requests to Dr. Isabel Ferreira, Department of Clinical Epidemiology and Medical Technology Assessment, Academic Hospital Maastricht, P. Debyelaan 25, 6202 AZ, Maastricht, the Netherlands; e-mail: i.ferreira@epid.unimaas.nl

© 2006 by the American Journal of Hypertension, Ltd.

Published by Elsevier Inc.

doi:10.1016/j.amjhyper.2006.04.014

