Sex Hormones and Membrane Microviscosity in Elderly Women

To the Editor:

We read with great interest the recent article by Dr Vaccarino and colleagues dealing with the gender differences in health status after coronary artery bypass (CABG) surgery. The results of their study demonstrated that at 6 months, the physical function and mental health improved in men (mean age, 64.2 years old) significantly more than in women (mean age, 69.6 years old). In addition, it was demonstrated that the absolute rate of adverse outcomes, such as hospital readmission, worsening functional status, and worsening mental health were significantly higher in women than in men. The authors proposed that CABG surgery is associated with lower functional gains and higher readmission rates in women compared with men.

Evidence indicates that vascular endothelial function is markedly influenced by estrogen, and is improved by hormone replacement therapy in postmenopausal women. In an in vitro study presented earlier, we demonstrated that 17β-estradiol increased membrane fluidity (a reciprocal value of membrane microviscosity) of erythrocytes and improved the rigidity of cell membranes in postmenopausal women via a nitric oxide (NO)- and cGMP-dependent mechanism. In a separate series of experiments, we showed that hormone replacement therapy restored the membrane microviscosity in elderly women with a concomitant increase in plasma NO metabolite level. These findings suggest that, because abnormalities in membrane microviscosity could cause a disturbance in the rheological behavior and the microcirculation, estrogen-deficiency might be involved in the pathogenesis of vascular complications in elderly women. Recently, the role of estrogen in male physiology has also become evident, and normal physiological estrogen, which is converted from testosterone by aromatase, may confer cardiovascular benefits for elderly men. In this context, we speculate that changes in sex hormones might modify the course of cardiovascular diseases both in men and women. Therefore, we would like to know whether the endogenous sex hormones might be different between men and women after CABG surgery. It would be important to assess more precisely the relationship between sex hormone status and vascular complications after CABG surgery in the elderly.

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Response

We appreciate the comments from Drs Tsuda and Nishio. We did not have information on menopausal status or on endogenous sex hormone levels in our study. Although numerous favorable effects of estrogen on the vasculature have been described, including the findings that Drs Tsuda and Nishio report in their letter, potentially adverse effects have also been noted, such as proinflammatory properties of exogenous estrogen replacement therapy. Importantly, the role of estrogen as a protective factor toward cardiovascular events in women and without established coronary atherosclerosis has been questioned by recent randomized trials. The endogenous estrogen molecule, 17β-estradiol, has also failed to show a protective effect in a recent trial examining progression of coronary atherosclerosis in postmenopausal women with coronary artery disease. Therefore, there is little evidence currently that estrogen deficiency is a major factor in patients’ clinical course and health status after coronary artery bypass graft surgery.

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