Editorial Comment

A New Prognostic Factor for Myocardial Infarction Recovery

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Reperfusion therapy during the acute phase of myocardial infarction has improved the prognosis of patients by decreasing the infarct size. However, even among patients with similar infarct sizes, the prognosis may vary. We previously showed that left ventricular (LV) remodeling is not necessarily related to infarct size (*1*), and many clinical studies demonstrated that the long-term progression of LV remodeling is closely related to a poor prognosis (*2*).

Remodeling occurs in both infarcted and non-infarcted regions. Histological findings show the progression of myocyte hypertrophy and fibrosis in these regions. These reactive phenomena are required to some degree in the healing and adaptive stage; however, excessive and maladaptive changes lead to LV remodeling and poor prognosis.

Garot *et al*. previously demonstrated that a decrease in coronary flow reserve (CFR) is associated with the progression of the LV remodeling at the acute phase of myocardial infarction (*3*). In this issue of *Hypertension Research*, Ohara *et al*. non-invasively assessed CFR at the sub-acute phase using ^{15}O-water positron emission tomography, and showed that CFR at the sub-acute phase is correlated with LV remodeling at the chronic phase (*4*). These findings suggest a close relationship between CFR and LV remodeling.

Previous studies have demonstrated that activation of the renin-angiotensin system (RAS), as well as oxidative stress, inflammation, and aging have profound effects on LV remodeling, and that their effects are long lasting (*5*). The administration of angiotensin converting enzyme inhibitor (ACEI), angiotensin receptor blocker (ARB) and β-blocker prevents LV remodeling, at least partially through the inhibition of RAS, oxidative stress, and inflammation. Ohara *et al*. expanded these findings by demonstrating that CFR affects LV remodeling even among patients treated with ACEI or ARB (*4*). Ischemic myocardium is susceptible to the pro-inflammatory effect (*6*), and thus, the preserved CFR may exert protective effects. Intracoronary cell therapy has been expected to exert beneficial effects on LV function and remodeling in patients with myocardial infarction (*7*). As the most expected effect is the restoration of the microvasculature (*8*), these benefits of intracoronary cell therapy may be provided partly through the improvement of CFR.

However, Ohara *et al*. showed that the interruption of ACEI or ARB was associated with low CFR at the sub-acute phase and low LV ejection fraction at the chronic phase (*4*). This result suggests that the administration of ACEI or ARB contributed to preserving CFR by preventing LV remodeling. However, there is still a paucity of evidence for cause-and-effect between CFR and LV remodeling. In this issue of *Hypertension Research*, Ohara *et al*. demonstrated that the difference in CFR at the sub-acute phase predicted later changes in the LV chamber (*4*). It is well known that elderly patients with acute myocardial infarction have a poor prognosis with the progression of LV remodeling, independent of infarct size (*9*). Several studies have demonstrated that CRF is decreased in normal elderly people (*10*, *11*). Considering these studies, the impaired CFR is likely to cause the progression of LV remodeling in patients with myocardial infarction, although LV remodeling may also affect CFR.

Currently, reperfusion therapy is widely conducted and has contributed to the improvement of the prognosis of patients

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with myocardial infarction. Ohara *et al*. (*4*) have suggested that the therapeutic strategy for the improvement of CFR in addition to reperfusion therapy further improves the prognosis through the prevention of LV remodeling. The reasons for the scatter of CFR among the patients treated with ACEI or ARB remain unclear in this study. Richer *et al*. previously showed no changes in CFR following the improvement of LV hypertrophy and fibrosis with the administration of ACEI and/or ARB in a myocardial infarction animal model (*12*). However, Ohara *et al*. (*4*) demonstrated a significant difference in CFR between the continuously treated group and the interrupted group, suggesting that the administration of ACEI and ARB was at least partly responsible for the attenuated deterioration of CFR. As the authors proposed, the switch to ARB in cases where ACEI is interrupted due to cough may be a therapeutic choice for the preservation of CFR in patients with myocardial infarction.

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