Bradykinin and Catecholamines in Cardiac Dysfunction After Cerebral Ischemia

To the Editor:

We read with great interest the article by Dr Min and colleagues dealing with the relationship between cardiac dysfunction and cerebral focal ischemia. The results of their study demonstrated that, in a mouse model of permanent middle cerebral artery occlusion, left focal ischemia could lead to cardiac dysfunction, which was inversely correlated with the severity of left insular cortex damage. The authors also indicated that the serum and heart levels of norepinephrine (NE) were raised in mice that had cardiac dysfunction. The authors propose that cerebral ischemia might produce cardiac dysfunction and further suggest that excess catecholamines could mediate the myocardial impairment.

Evidence indicates that bradykinin might actively participate in the pathophysiology of cerebral ischemia. Kamiya et al showed that bradykinin levels in plasma and tissues corresponded to cerebral edema progression and that bradykinin suppression decreased ischemic brain edema formation after bilateral common carotid artery occlusion in rats. It was also demonstrated that in the ischemic neuronal models, ischemia significantly increased NE release in the rat spinal cord. In a study we presented earlier, the change in NE release induced by bradykinin was investigated in the hypothalamus of normotensive and spontaneously hypertensive rats. In an in vitro study using rat brain slices, we showed that bradykinin increased the stimulation-evoked NE release in a dose-dependent manner. It was also shown that a dihydropyridine-sensitive Ca channel agonist, Bay K 8644, significantly potentiated the facilitatory effect of bradykinin on NE release. In contrast, a dihydropyridine-sensitive Ca channel blocker, nicardipine, inhibited the increase in NE release evoked by bradykinin and Bay K 8644. The finding might suggest that bradykinin might stimulate NE release by increasing transmembrane Ca influx in the central nervous system. These observations might propose the hypothesis that bradykinin might activate the central sympathetic nervous system and have a crucial role in the pathophysiology of neuronal ischemia. Because the authors mentioned that the altered sympathetic nerve activity could provoke myocardial impairment, we would like to know whether the contents of bradykinin as well as catecholamines might be changed in the injured regions of the brain and be associated with the cardiac catecholamine contents in the study of Dr Min and colleagues. Further studies should be performed to assess more precisely the relationships between bradykinin and sympathetic nervous system and their contribution to the pathogenesis of cardiac dysfunction through the brain and heart connection mechanism.

Disclosures

None.

Kazushi Tsuda, MD, FAHA
Cardiovascular and Metabolic Research Center
Kansai University of Health Sciences
Osaka, Japan