

The effects of quercetin protect cardiomyocytes from A/R injury is related to its capability to increasing expression and activity of PKC ϵ protein

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Received: 17 February 2013 / Accepted: 14 June 2013 / Published online: 23 June 2013
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Abstract Quercetin is a ubiquitous flavonoid found in vegetable foods. Epidemiological and animal studies have reported an inverse association between quercetin intakes and occurrence and development of various cardiovascular diseases. Some researchers have inferred that the mechanisms of quercetin to protect cardiomyocytes from ischemia/reperfusion injury may be involved in modulation of intracellular signal pathways and regulation of proteins expression beyond its antioxidant activity. The aim of this study was to investigate whether quercetin protect cardiomyocytes from anoxia/reoxygenation injury through PKC ϵ pathway. Neonatal rat primary cardiomyocytes were pretreated with quercetin or quercetin plus ϵ V1-2, a selective PKC ϵ inhibitor, prior to A/R treatment. Western blotting analysis showed that the level of PKC ϵ and phosphor-PKC ϵ Ser297 in the quercetin pretreatment group were all increased significantly compared to the control or A/R group. Subsequent assays showed that pretreated with quercetin could increase the viability of neonatal rat

primary cardiomyocytes suffered A/R, decrease the apoptosis and ROS and alleviate the loss of mitochondrial membrane potential induced by A/R injury. However, the protective effects of quercetin disappeared in the group pretreated with ϵ V1-2. Thus, for the first time, we revealed that one of the mechanisms of quercetin protecting cardiomyocytes from A/R injury might be increase the expression of PKC ϵ protein and then enhance the activity of its downstream pathway.

Keywords Quercetin · PKC ϵ · Cardioprotection · Anoxia/reoxygenation

Introduction

Myocardial cell death and heart failure due to ischemia/reperfusion (I/R) injury are the major cause of mortality around the world. In the past few decades, it has been found that some plant compounds, such as flavonoids, possess the cardioprotective effects. Quercetin (3,3',4',5,7-pentahydroxyflavanone) is a ubiquitous flavonol found in a variety of foods including apples, berries, *Brassica* vegetables, capers, grapes, onions, shallots, tea, and tomatoes, as well as red wine [1]. Animal evidences suggested that quercetin could protect brain [2], heart [3], and other tissues [4–7] from oxidative stress injury induced by ischemia–reperfusion. Several epidemiological studies have reported an inverse association between quercetin intakes and coronary heart disease or heart disease mortality [8, 9]. Although the beneficial effects of flavonoids in cardiovascular diseases were attributed mainly to their antioxidant action, they were also found to have additional protective mechanisms including regulating the activity of some intracellular signaling pathway (e.g., NF-kappaB/p65

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