

Antioxidant Effects of C-Phycocyanin on Oxidized Astrocyte in Brain Injury Using 2D and 3D Neural Nanofiber Tissue Model

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Abstract : In brain injury, depleting oxidative stress is the most effective way to reduce the brain infarct size. C-phycocyanin (C-Pc) is a well-known antioxidant protein that has neuroprotective effects obtained from green microalgae. Astrocyte is glial cell that supports the nerve cell such as neuron, which account for a large portion of the brain. In brain injury, such as ischemia and reperfusion, astrocyte has an important role that overcomes the oxidative stress and protect from brain reactive oxygen species (ROS) injury. However little is known about how C-Pc regulates the anti-oxidants effects of astrocyte. In this study, when the C-Pc was treated in oxidized astrocyte, we confirmed that inflammatory factors Interleukin-6 and Interleukin-3 were increased and antioxidants enzyme, Superoxide dismutase (SOD) and catalase was upregulated, and neurotrophic factors, brain-derived neurotrophic factor (BDNF) and nerve growth factor (NGF) was alleviated. Also, it was confirmed to reduce infarct size of the brain in ischemia and reperfusion because C-Pc has anti-oxidant effects in middle cerebral artery occlusion (MCAO) animal model. These results show that C-Pc can help astrocytes lead neuroprotective activities in the oxidative stressed environment of the brain. In summary, the C-PC protects astrocytes from oxidative stress and has anti-oxidative, anti-inflammatory, neurotrophic effects under ischemic situations.

Keywords : c-phycocyanin, astrocyte, reactive oxygen species, ischemia and reperfusion, neuroprotective effect

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