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# β-Cryptoxanthin exerts greater cardioprotective effects on cardiac ischemia-reperfusion injury than astaxanthin by attenuating mitochondrial dysfunction in mice.

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## Abstract

**SCOPE:** β-Cryptoxanthin and astaxanthin are antioxidant carotenoid pigments that inhibit lipid peroxidation as potently as vitamin E. We hypothesized that acute treatment with β-cryptoxanthin and astaxanthin causes similar reductions in the sizes of cardiac infarcts caused by ischemia-reperfusion (I/R) injury by attenuating oxidative stress and cardiac mitochondrial dysfunction.

**METHODS AND RESULTS:** C57BL/6 mice (n = 36) were randomized to receive vehicle, β-cryptoxanthin, astaxanthin, or vitamin E at 50 mg/kg by gavage feeding prior to I/R injury. Cardiac I/R was induced by left anterior descending coronary artery ligation followed by reperfusion. All treatments significantly reduced infarct sizes by 36-57%, attenuated apoptosis and also attenuated cardiac mitochondrial dysfunction in the treated groups compared to the control group. Although astaxanthin and vitamin E exhibited similar efficacy with respect to cardioprotection, β-cryptoxanthin exhibited greater efficacy than its counterparts, as it reduced infarct sizes by 60%. β-Cryptoxanthin was more effective than astaxanthin and vitamin E because it reduced cardiac mitochondrial swelling, mitochondrial depolarization, the Bax/Bcl-2 ratio, and plasma and cardiac thiobarbituric acid reactive substances levels more significantly than its counterparts.

**CONCLUSION:** Acute β-cryptoxanthin treatment exhibits greater cardioprotective efficacy against I/R injury than astaxanthin and vitamin E by reducing infarct sizes and attenuating apoptosis, oxidative stress, and mitochondrial dysfunction.



**KEYWORDS:** Astaxanthin; Cardiac mitochondrial dysfunction; Infarct size; Ischemia reperfusion; β-Cryptoxanthin

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