C-Phycocyanin, a selective cyclooxygenase-2 inhibitor, induces apoptosis in lipopolysaccharide-stimulated RAW 264.7 macrophages.

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Abstract
C-Phycocyanin (C-PC) is one of the major biliproteins of Spirulina platensis, a blue green algae, with antioxidant and radical scavenging properties. It is also known to exhibit anti-inflammatory and anti-cancer properties. However, the mechanism of action of C-PC is not clearly understood. Previously, we have shown that C-PC selectively inhibits cyclooxygenase-2 (COX-2), an inducible isoform that is upregulated during inflammation and cancer. In view of the reported induction of apoptosis in cancer cells by cyclooxygenase-2 inhibitors, the present study is undertaken to test the effect of C-PC on LPS stimulated RAW 264.7 mouse macrophage cell line. These studies have shown a dose dependent reduction in the growth and multiplication of macrophage cell line by C-PC. This decrease in cell number appears to be mediated by C-PC induced apoptosis as evidenced by flow cytometric and confocal microscopic studies. Cells treated with 20 micro M C-PC showed typical nuclear condensation and 16.6% of cells in sub-G(0)/G(1) phase. These cells also showed DNA fragmentation in a dose dependent manner. The studies on poly(ADP ribose) polymerase (PARP) cleavage showed typical fragmentation pattern in C-PC treated cells. This C-PC induced apoptosis in RAW 264.7 cells appears to be mediated by the release of cytochrome c from mitochondria and independent of Bcl-2 expression. These effects of C-PC on RAW 264.7 cells may be due to reduced PGE(2) levels as a result of COX-2 inhibition.

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