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Quercetin-induced apoptosis acts through mitochondrial- and caspase-3-dependent pathways in human breast cancer MDA-MB-231 cells.

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Abstract

There has been considerable evidence recently demonstrating the anti-tumour effects of flavonols. Quercetin, an ubiquitous bioactive flavonol, inhibits cells proliferation, induces cell cycle arrest and apoptosis in different cancer cell types. The precise molecular mechanism of quercetin-induced apoptosis in human breast cancer cells is unclear. The purpose of this study was to investigate effects of quercetin on cell viability and to determine its underlying mechanism in human breast cancer MDA-MB-231 cells. Quercetin decreased the percentage of viable cells in a dose- and time-dependent manner, which was associated with cell cycle arrest and apoptosis. Quercetin did not increase reactive oxygen species generation but increased cytosolic Ca(2+) levels and reduced the mitochondrial membrane potential (DeltaPsi(m)). Quercetin treatment promoted activation of caspase-3, -8 and -9 in MDA-MB-231 cells. Caspase inhibitors prevented the quercetin-induced loss of cell viability. Quercetin increased abundance of the pro-apoptotic protein Bax and decreased the levels of anti-apoptotic protein Bcl-2. Confocal laser microscope examination indicated that quercetin promoted apoptosis-inducing factor (AIF) release from mitochondria and stimulated translocation to the nucleus. Taken together, these findings suggest that quercetin results in human breast cancer MDA-MB-231 cell death through mitochondrial- and caspase-3-dependent pathways.

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