Rosmanol potently induces apoptosis through both the mitochondrial apoptotic pathway and death receptor pathway in human colon adenocarcinoma COLO 205 cells.

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Abstract

Rosemary (Rosmarinus officinalis), a culinary spice and medicinal herb, has been widely used in European folk medicine to treat numerous ailments. Many studies have shown that rosemary extracts play important roles in anti-inflammation, anti-tumor, and anti-proliferation in various in vitro and in vivo settings. The roles of tumor suppression of rosemary have been attributed to the major components, including carnosic acid, carnosol, and rosmarinic acid, rosmanol, and ursolic acid. This study was to explore the effect of rosmanol on the growth of COLO 205 human colorectal adenocarcinoma cells and to delineate the underlying mechanisms. When treated with 50 μM of rosmanol for 24h, COLO 205 cells displayed a strong apoptosis-inducing response with a 51% apoptotic ratio (IC(50) ~42 μM). Rosmanol increased the expression of Fas and FasL, led to the cleavage and activation of pro-caspase-8 and Bid, and mobilized Bax from cytosol into mitochondria. The mutual activation between tBid and Bad decreased the mitochondrial membrane potential and released cytochrome c and apoptosis-inducing factor (AIF) to cytosol. In turn, cytochrome c induced the processing of pro-caspase-9 and pro-caspase-3, followed by the cleavage of poly-(ADP-ribose) polymerase (PARP) and DNA fragmentation factor (DFF-45). These results demonstrate that the rosmanol-induced apoptosis in COLO 205 cells is involvement of caspase activation and involving complicated regulation of both the mitochondrial apoptotic pathway and death receptor pathway.