The interaction of flavonoids with mitochondria: effects on energetic processes.


Source

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Abstract

The study addressed aspects of energetics of isolated rat liver mitochondria exposed to the flavonoids quercetin, taxifolin, catechin and galangin, taking into account influences of the 2,3 double bond/3-OH group and 4-oxo function on the C-ring, and o-di-OH on the B-ring of their structures, as well as mitochondrial mechanisms potentially involved in cell necrosis and apoptosis. The major findings/hypothesis, were: The 2,3 double bond/3-OH group in conjugation with the 4-oxo function on the C-ring in the flavonoid structure seems favour the interaction of these compounds with the mitochondrial membrane, decreasing its fluidity either inhibiting the respiratory chain of mitochondria or causing uncoupling; while the o-di-OH on the B-ring seems favour the respiratory chain inhibition, the absence of this structure seems favour the uncoupling activity. The flavonoids not affecting the respiration of mitochondria, induced MPT. The ability of flavonoids to induce the release of mitochondria-accumulated Ca(2+) correlated well with their ability to affect mitochondrial respiration on the one hand, and their inability to induce MPT, on the other. The flavonoids causing substantial respiratory chain inhibition or mitochondrial uncoupling, quercetin and galangin, respectively, also decreased the mitochondrial ATP levels, thus suggesting an apparent higher potential for necrosis induction in relation to the flavonoids inducing MPT, taxifolin and catechin, which did not decrease significantly the ATP levels, rather suggesting an apparent higher potential for apoptosis induction.

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