Antioxidant and pro-oxidant properties of pyrroloquinoline quinone (PQQ): implications for its function in biological systems.


Source

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Abstract

Pyrroloquinoline quinone (PQQ) is a novel redox cofactor recently found in human milk. It has been reported to function as an essential nutrient, antioxidant and redox modulator in cell culture experiments and in animal models of human diseases. As mitochondria are particularly susceptible to oxidative damage we studied the antioxidant properties of PQQ in isolated rat liver mitochondria. PQQ was an effective antioxidant protecting mitochondria against oxidative stress-induced lipid peroxidation, protein carbonyl formation and inactivation of the mitochondrial respiratory chain. In contrast, PQQ caused extensive cell death to cells in culture. This surprising effect was inhibited by catalase, and was shown to be due to the generation of hydrogen peroxide during the autoxidation of PQQ in culture medium. We conclude that the reactivities of PQQ are dependent on its environment and that it can act as an antioxidant or a pro-oxidant in different biological systems.

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