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## Influence of the Oxidized and Reduced Forms of Coenzyme Q10 (Ubiquinone and Ubiquinol) to Cerebral Endothelial Cells in the Blood Brain Barrier Model

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The ability of coenzyme Q10 to penetrate the blood-brain barrier (BBB) makes it a potential agent that affects the metabolism of mitochondria of cells in the neurovascular unit of the brain, but the mechanisms of penetration and action on cells are not fully understood. In this work, we studied the permeability of a three-cell BBB model *in vitro* under the action of different doses and the time of action of Ubiquinol (Re-CoQ10) and Ubiquinone (Ox-CoQ10) with evaluation of Rac-1 protein expression. During the study of the effect of drugs on the value of transendothelial electrical resistance (TEER), it was found that Re-CoQ10 is able to affect the BBB permeability in different concentrations in different ways: to increase the BBB permeability at a dose of 1  $\mu$ M and reduce it at a dose of 10  $\mu$ M. Ox-CoQ10 is able to increase the BBB permeability at a dose of 1  $\mu$ M. Registration of Rac-1 protein expression showed that both compounds are able to reduce the expression of Rac-1 in the BBB model, contributing to a decrease in the production of reactive oxygen species, thereby showing an antioxidant effect for 120 min. The maximum effect of reducing Rac-1 immunopositive cells was observed when exposed to Re-CoQ10 at a dose of 10  $\mu$ M for 15 min. Given their effect on mitochondria, the involvement of mitochondrial activity of cerebral endothelial cells in the regulation of barrier permeability is potentially possible.

**Keywords:** Coenzyme Q10, Ubiquinol, blood brain barrier, cerebral endothelium, reactive oxygen species, apoptosis, Rac-1