EFFECT OF PLASMA MEMBRANE POTENTIAL MODIFICATIONS ON THE MICROTUBULE ORGANIZATION OF BOVINE CORNEAL ENDOTHELIAL CELLS IN CULTURE

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Introduction: In previous studies we found that modifications of the plasma membrane potential (PMP) of bovine corneal endothelial cells (BCE) in culture provoke characteristic changes in the actin and microtubule cytoskeletons.

Objectives: In this work we performed more detailed studies on the effect of PMP changes on the microtubule cytoskeleton and the possible signaling pathways involved. We particularly explored the role of tau, a microtubule-associated protein that, depending on its phosphorylation state, stabilizes or destabilizes the microtubule structure.

Materials and Methods: we employed media of different composition to produce changes in the PMP in BCE cells in culture. We assessed changes in the distribution of microtubules and in the phosphorylation state of tau-p-214, a site specifically phosphorylated by PKA, by immunofluorescence, Western blot and inhibition of PKA.

Results: PMP depolarization provoked a decrease in the amount of tubulin filaments at the cell periphery. Correspondingly, PMP hyperpolarization increased the amount of filaments at that location. In the two cases, the total amount of tubulin filaments remained unchanged. We also found that both PMP hyperpolarization and inhibition of PKA decreased p-tau levels at the cell periphery.

Conclusions: Our data suggest that microtubules respond to modifications in the PMP and that tau phosphorylation mediated by PKA could participate in this process. These changes in the phosphorylation level of tau could therefore be involved in the alterations in the stability of cell junctions caused by modifications in the PMP.

Key words: microtubules, membrane potential, p-tau

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