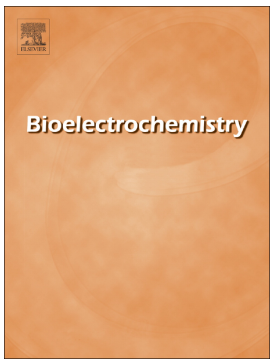

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Electrotaxis of Tumor-initiating Cells of H1975 Lung Adenocarcinoma Cells Is Associated with Both Activation of Stretch-activated Cation Channels (SACCs) and Internal Calcium Release

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Abstract

The metastatic potential of cancer cells is related to their migratory ability, which is influenced by *in vivo* microenvironment possessing specific physiochemical factors including electric properties. In the present study, we isolated two different subsets of lung adenocarcinoma H1975 cells, as side population (SP) and main population (MP). SP cells were demonstrated to have cancer stem cell characteristics. Using a microscale device to provide physiological direct-current electric field (dcEF), we investigated the electrotactic responses of the SP and MP cells. The results showed that both SP and MP cells exhibited enhanced cathodal migration ability with actin reorganization and transient intracellular calcium ions ($[Ca^{2+}]_i$) increase under dcEF stimulation. For SP cells, the treatment of either stretch-activated cation channels (SACCs) inhibitor or the blockage of intracellular Ca^{2+} release could partially inhibited dcEF-activated $[Ca^{2+}]_i$ increase, and the concomitant treatment led to a complete inhibition. For MP cells, SACCs activation was entirely responsible for EF-activated increase of $[Ca^{2+}]_i$. All these results suggested that that intracellular Ca^{2+} activation may be associated with cancer cell tumorigenicity and metastasis.

Keywords

Microscale device; Cancer stem cell; Migration; Electric field; Ion channel