

Review

Non-beating HL-1 cells for confocal microscopy: Application to mitochondrial functions during cardiac preconditioning

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Abstract

HL-1, the first cell line with a cardiac phenotype for biological experiments, displays spontaneous electrophysiological and mechanical regular activity, and cyclic calcium movements. We isolated a derived line, devoid of transient movements, for confocal microscopy experiments. These cells do express cardiac proteins: connexin 43, the cardiac isoform of dihydropyridine receptors, desmin, and developmental myosin but have no sarcomeric arrangement. They still possess the electrophysiological characteristics and ionic currents of cardiac cells, among them the cardiac potassium current IK_r . We also found diazoxide and glibenclamide sensitive potassium channels with properties similar to IK_{ATP} in adult cardiac myocytes. The pacemaker current I_f was not observed, in agreement with the cells showing excitability but lacking in pacemaker activity.

The absence of movement is an advantage for studies which include changes of media in order to follow morphological changes under continuous perfusion. We observed however a basal spontaneous movement of mitochondria and we developed a method to quantify its amplitude using confocal microscopy. No mitochondrial depolarization could be detected when the membrane potential was measured by using very

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low light photomultiplier and confocal fluorescence imaging under the K_{ATP} channel opener diazoxide. Thus cardiac pharmacological preconditioning by K_{ATP} channel openers might involve other routes than mitochondrial K channels targeting.

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