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Isfahan University of Medical Sciences

Functional expression of delayed rectifier potassium channels in cardiomyocytes derived from embryonic stem cells

S. Abtahi[1,*], H. Sadraei[2], M. Nasr Esfahani[3], H. Baharvand[3]

[1]*AJA University of Medical Sciences, Tehran, Iran*
[2]*Department of Pharmacology and Toxicology and Isfahan Pharmaceutical Sciences ,ResearchCenter Isfahan ,harmacyandPharmaceuticalSciencesSchoolofPUniversity of Medical Sciences, Isfahan, I.R.Iran.*
[3]*Department of Cell and Molecular Biology ,Royan Institute for Animal Biotechnology ,ACECR, Isfahan, I.R.Iran*

Background and Aims: Reverse transcriptase polymerase chanin reaction (RT-PCR) studies shows expression of potassium channels in mouse embryonic stem cell derived cardiomyocytes (ES-cardiomyocytes) but functional activity has not been reported in the ,Therefore .cells ١Royan B rch was to detect the functional objecitve of this reseaactivity of these potassium channels from stem cell stage and after differentiation into cardiomyocyte.
Methods: Mouse embryonic stem (ES) cells were differentiated into beating cardiomyocytes by hanging drop method. The ES cells and ES-cardiomyocytes were isolated to single cell suspension for -current recording using whole cell patch +Kclamp technique. The bath solution included130mM NaCl and 1.5 mM $CaCl_2$. The intracellular pipette solution included 130 mM KCl, 3 mM ATP and 0.2mM EGTA.
Results: The predominant depolarizing current in ES-cardiomyocytes was a tetraethylammonium (TEA,10 mM) sensitive current which was partially blocked by nifedipine (1 μM) and attenuated by increasing concentration of EGTA (10 mM) inPharmacology and .the pipette solution electrophysiological properties of this oscillatory sustained current very well matched with characteristics of Ca2+ activated potassium current. In addition there was another kind of sustained outward K+ curren .(mM ١)diaminopyridine -٣,٤hich was resistance to TEA but was inhibited by w The characteristic features of this current indicate that this current was due to activation of delayed rectifier potassium channels.
Conclusions:RT-PCR studies confirms expression of K+ channels in ES-cardiomyocytes. However thesechannels to less extant were also expressed in early stem cell stage. The present study shows that at early stage, these channles are not when functional but develop into specific potassium ionic currents the cells convert into adult cardiomyocytes.

Keywords: Patch-clamp; ţem cel ES-cardiomyocytes; K+ current