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THE CHARACTERISTIC OF IONIC CURRENT IN AMNIOTIC MEMBRANE-HUMAN MESENCHYMAL STROMAL CELLS (AM-HMSCS) CULTURED UNDER CARDIOMYOCYTES MICROENVIRONMENT IN VITRO

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Purpose To study the development and differentiation of ion current in AM-hMSCs under the cardiac microenvironment by using myocardial cell lysate.

Method The amniotic membrane was gathered and digested to get mesenchymal stem cell. The isolated AM-hMSCs were cultured in different medium of DMEM with or without myocardial cell lysate. The mRNA of AM-hMSC was collected after 2 week, and the Reverse transcriptase- polymerase chain reaction (RT-PCR) were then performed to detect the mRNA expression of ion channel encoding subunits. The ionic current was recorded under the whole cell mode with patch clamp.

Result There were 3 types outward current could be recorded in the AM-hMSCs, including the delayed rectifier potassium current (IkDR.) (90%), Calcium-activated potassium current (IkCa) (43.3%), and transient outward current (Ito) (16.7%). The inward currents were absent. Cultured in the medium with myocardial cell lysate, the induced AM-hMSCs can initiate the If current expression and increase the expression of Ito current (16.7% vs 30.7%, $p=0.04$). The ion channel mRNA were detected in the AM-hMSCs, including the MaxIK (for IkCa), Kir2.1, Kv1.4 (for Ito), HminK (for IkDR.). The mRNA expressions of the ion channel of HCN2 (for If) can be detected in the AM-hMSCs cultured with myocardial cell lysate.

Conclusion This is the first study of the electrophysiology property in AM-hMSCs. The AM-hMSC can express a distinct pattern of ion channel mRNA and functional ion channels, including MaxIK (for IkCa), Kir2.1, Kv1.4 (for Ito), HminK (for IkDR.). The AM-hMSCs cultured under the microenvironment by using myocardial lysate can initiate the If current and HCN2 expression, and increase the expression of Ito.