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AUTOTRANSPLANTATION OF GENETICALLY-ALTERED MESENCHYMAL STEM CELLS IN PORCINE WITH COMPLETE HEART BLOCK

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Objective To assess the effect of transplantaion of autologous mesenchymal stem cells carrying human hyperpolarisation activated cyclic nucleotide gated channel 2 (hHCN2) gene into the His-bundle in porcine complete heart block (CHB) model.

Methods We constructed the recombinant adenovirus containing hHCN2 gene to transfect porcine MSCs. After autotransplantation into the His-bundle in CHB model, the genetically-altered MSCs were tested for their ability to provide a stable and catecholamine-responsive heart rhythm. Histological and immunofluorescence analyses were also performed on the myocardium of injection site.

Results Recombinant adenovirus pAd.hHCN2 was constructed. Porcine MSCs were transfected by the adenovirus. After autotransplantation, transgenic MSCs could significantly enhance the heart rates compared with the control group ($p < 0.01$) in CHB model. Rhythms were catecholamine responsive. Tissues from the hearts showed that the MSCs survived in myocardium and overexpressed hHCN2 protein.

Conclusion Autologous genetically-altered MSCs administered to the His-bundle could serve as a catecholamine-responsive biological pacemaker in porcine CHB.