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Electrophysiological characteristics of heart ventricular papillary muscles from histidine decarboxylase knockout and wild-type mice: effects of rosiglitazone

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Background: Thiazolidinediones (troglitazone, rosiglitazone), synthetic peroxisome proliferator-activated receptor agonists, act as insulin sensitizers but beyond their antidiabetic actions improve cardiac function in experimental animals.
Aim and Methods: Our first aim was to characterise the electrophysiological parameters of right ventricular papillary muscles from histidine decarboxylase knockout (HDC KO) mice compared with those of wild-type (WT) by standard microelectrode technique. Furthermore we investigated the effects of rosiglitazone (1, 3, 30 μM) on transmembrane action potentials.
Results: In KO mice statistically significant prolongation of action potential duration (APD) and decrease in maximum rate of rise of depolarisation phase (V_{max}, dV/dt) can be observed. Rosiglitazone caused a concentration-dependent shortening of APD in both types of mice but reduced V_{max} only in WT mice.
Conclusions: The most important difference in the electrophysiological parameters (APD, V_{max}) between HDC KO and WT mice could be due to the fact that HDC KO mice are more susceptible for hyperglycaemia. The results also suggest that rosiglitazone might act on K^+ channels and this effect might take part in the protective effect of rosiglitazone in ischemia/reperfusion injury observed in rats, but further, direct ionic current measurements need to support this explanation.

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