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Preconditioning Protects Hyperthyroid Hearts but Attenuates HSP70 mRNA Induction

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BACKGROUND

Preconditioning (PC) is a well defined means of protecting the normal heart from ischaemia. The aim of this study was to investigate whether PC response is altered in the diseased heart such as the hyperthyroid heart. Hyperthyroidism is associated with cardiac hypertrophy, myocardial glycogen depletion and PKC ε repression.

METHOD

Hyperthyroidism was achieved with L-thyroxine administration (25 μg/100g sc daily for 2 weeks) (THYR) while rats treated with normal saline served as controls (NORM). Isolated rat hearts were perfused in Langendorff mode. Hearts were subjected to 20 min of ischaemia (I) and 45 min of reperfusion (R), THYR, n=8 and NORM, n=6. Preconditioned hearts underwent a standard PC protocol before ischaemia: 3 min of global zero flow ischaemia, 5 min R followed by 5 min I and 5 min R followed by I and R, NORM PC,n=12 and THYR PC, n=10. Postischaemic recovery of left ventricular developed pressure was expressed as % of the preischaemic value LVDP%.The induction of HSP 70 mRNA at 45 min of reperfusion was detected by Northern hybridization.

RESULTS

(a) LVDP% was 62.4 (SEM 3.1) and 72.3 (2.5) for NORM PC and THYR PC and 38.1(3.9) and 38.1(6.2) for THYR and NORM respectively, $p<0.05$.
(b) HSP70 mRNA induction was 262% greater in THYR compared to NORM hearts, $p<0.05$. With prior preconditioning, HSP 70 m RNA in THYR PC was derated to a level 60% less than in NORM PC hearts, $p=0.008$.

CONCLUSION

Preconditioning improves functional recovery in THYR hearts but attenuates HSP70 mRNA induction. Altered anaerobic metabolism and PKC ε repression in hyperthyroid heart may account for the reduced HSP70 mRNA expression.