Heat preconditioning reduces subsequent ischemia reperfusion injury in rat kidney: A possible role for HSP-72.

Abstract:

Improving the ability of the kidney to tolerate ischemic injury has importantimplication in renal transplantation. On the other hand, thermo tolerance describes the process in which hyperthermia induces a transient resistance of the stressed cells to subsequent episodes of oxidative stress. The current study was performed to evaluate the beneficial effect of heat preconditioning induced HSP-72 formation on renal ischemia reperfusion (I/R) induced damage. Four groups of rats (n=20/group) were included: control sham-operated group (group I), heat-preconditioned sham-operated group (group II), I/R injury group (group III) and heat pre-conditioned I/R injury group (group IV). Heat-preconditioning was induced 24 h prior to sham operation and or I/R injury by increasing the core body temperature to (41±0.5 ˚C) for 20 min. The rat kidneys were subjected to ischemia by 20 min. of bilateral renal artery occlusion followed by reperfusion for 24 and 48 h. After 24 and 48 h. of reperfusion, serum urea, creatinine, 24 h. urine out put and albumin content as well as the renal HSP-72 gene expression and MDA level were measured. Also light microscopic examination of renal tissue specimens was performed. It was found that group IV had a significant increase in renal HSP-72 gene expression compared to group III (898.36±107.82 versus 572.88±47.08 µg/g tissue), associated with a significant improvement of its renal functions including serum urea, creatinine and 24 h urine volume out put. Also there was a reduction in renal tissue injury detected by a significant decrease in urine albumin content, a significant decrease in renal MDA level and improvement in specimen microscopic picture compared to group III. The increase in HSP-72 expression and its renoprotective effect were significantly greater 24 h. after I/R than after 48 h. Thus it can be concluded that upregulation of HSP-72after heat preconditioning has a renal beneficial effect and can be a target for protection of renal functions during I/R injury.

Key words: HSP-72 - Renal ischemia – Heat preconditioning.