Hypothermia protects against renal fibrosis after ischemia reperfusion injury

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Background: Although hypothermia protects against the renal injury induced by ischemia reperfusion, the detailed molecular pathway(s) involved in the process remain unknown. Proliferator-activated receptor-gamma coactivator 1alpha (PGC-1α) is known to protect against renal injury. Furthermore, hypothermia may induce PGC-1α in the brain and the kidneys. We evaluated the role of PGC-1α in hypothermia protection against renal ischemia reperfusion injury (IRI).

Methods: We prepared a fibrosis model by inducing ischemia reperfusion injury. C57BL/6 mice were divided into the following groups: sham mice and ischemia reperfusion injury mice (37°C vs. 32°C). The kidneys were harvested 20 minutes after the induction of renal ischemia and on day 1, day 3, day 7, and after IRI. Fibrosis markers and the renal injury score were evaluated.

Results: The blood urea nitrogen levels, and serum creatinine levels, and the histologic renal injury scores were significantly lower in the 32°C IRI groups than in the 37°C ischemia reperfusion injury groups. The protein levels of fibrosis markers were significantly decreased, while the bone morphogenetic protein 7 (BMP7) and PGC-1α level was significantly increased in the 32°C ischemia reperfusion injury mice group. Hypothermia increased the PGC-1α both, *in vivo* and *in vitro*. Knock down of PGC-1α expression increased *in vitro* renal fibrosis.

Conclusions: Hypothermia ameliorates renal function deterioration and renal fibrosis in renal IRI mice kidneys. Moreover, hypothermia increases PGC-1α in renal IRI mice kidneys. Therefore, PGC-1α may play a role in hypothermic protection in renal fibrosis following IRI.

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