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Glutamine Protects Renal Tubular Cells through the JNK-dependent Pathway in Rats with Glycerol-induced Acute Renal Failure

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Background : Rhabdomyolysis-induced myoglobinuric acute renal failure (ARF) undergoes apoptosis of renal tubular epithelial cells. Glutamine is known to be rate-limiting amino acid for glutathione synthesis under oxidative stress, which is related to JNK activation. In this present study, we demonstrated the protective effect of glutamine on JNK and caspase-3-mediated apoptotic pathway in the glycerol model of rhabdomyolysis-induced ARF.

Methods : Rat with glutamate pretreatment were treated with glycerol and then were sacrificed 4, 8, 12, 24 h after glycerol treatment. We examined whether glutamine influences apoptosis blocking in glycerol-induced ARF by evaluating renal histology, TUNEL staining, the expression of JNK and caspase-3 using immunohistochemistry and western blot.

Results : Histologic analysis represented tubular necrosis, epithelial cell vacuolization and myoglobin casts in tubules with Glycerol treatment, but there were less tubular damages in glutamine pretreated rat with glycerol treatment. Glutamine pretreatment was decreased TUNEL-stained apoptotic cells in renal tubule of rat with glycerol treatment. In particular, four hours after glycerol treatment, the expression of JNK and caspase-3 protein was decreased in rats with glutamine pretreatment.

Conclusion : These findings suggest that cooperation between JNK and caspase-3 may play a role in renal tubular cell damage and that glutamine pretreatment may protect, at least partly, against apoptosis in this glycerol-induced ARF model.