

Tetramethylpyrazine protects rat renal tubular cell apoptosis induced by gentamicin

阮淑慧

Juan SH;Chen CH;Hou CC;Chen TH;Lin H;Chu YL;Su

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摘要

Abstract

Background. Gentamicin, a widely used antibiotic for the treatment of bacterial infection, can cause nephrotoxicity. Tetramethylpyrazine (TMP) is a compound purified from the rhizome of *Ligusticum wallichii* (Chuanxiong) and has been found to protect against ischaemia – reperfusion injury, nephritis and alcohol-induced toxicity in rat kidneys.

Methods. We used rat renal tubular cells (RTCs), NRK-52E, in this study. The cytotoxicity of gentamicin was checked with transferase-mediated deoxyuridine triphosphate nick end-labeling (TUNEL) staining, and the generation of reactive oxygen species was measured using the fluorescent probe 2,7-dichlorofluorescein. We evaluated several apoptotic parameters: cleaved caspase levels, tumour necrosis factor (TNF-) excretion and nuclear factor Kappa B (NF-B) activity. We also examined the TMP protective effect on gentamicin-induced apoptosis in rat kidneys.

Results. The results of this study showed that gentamicin was found to markedly induce apoptosis in NRK-52E cells in a dose-dependent manner; that TMP expressed a dose-dependent protective effect against gentamicin-induced apoptosis; that pre-treatment of the cells with 50 or 100 μ M of TMP effectively decreased the reactive oxygen species formation induced by gentamicin; that TMP was found to inactivate the gentamicin-stimulated activities of caspase-3, caspase-8 and caspase-9, to inhibit gentamicin-induced release of cytochrome c, as well as to raise the expression of Bcl-xL; that TMP inhibited the gentamicin-induced TNF- excretion, and inactivated the transcription factor NF-B; and that the TMP treatment significantly reduced apoptotic injury in rat RTCs.

Conclusions. Based on the results of this study, we suggest that TMP can attenuate

gentamicin-induced oxidative stress and apoptotic injury in rat RTCs, and that its character may have therapeutic potential for patients with renal diseases.