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순무 (*Brassica rapa*) 뿌리 에탄올 추출물의 Cisplatin 유도에 의한 LLC-PK$_1$ 돼지 신장 세포주 및 흰쥐에서 신독성 보호효과

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Protective Effect of the Ethanol Extract of the Roots of *Brassica rapa* on Cisplatin-Induced Nephrotoxicity in LLC-PK$_1$ Cells and Rats.

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Objectives

This study was conducted to determine whether the ethanol extract of the roots of *Brassica rapa* (EBR) ameliorates cisplatin-induced nephrotoxicity in terms of oxidative stress, as characterized by lipid peroxidation, reactive oxygen species (ROS) production, and glutathione (GSH) depletion in LLC-PK1 cells and Rats.

Materials and Methods

○ Materials

Brassica rapa was collected from GangHwa Country, Incheon, Korea during September 2005. The plant was identified by Dr. Hae-Gon Chung, one of the authors. A voucher specimen (#05157) has been deposited at the Laboratory of Natural Product Chemistry, Kyung-Hee University. Freshroot (100g) was cut and extracted three times with EtOH (3 × 1 L). Extract solutions were filtered and dried using a rotatory evaporator under reduced pressure to give the EtOH extract (10.6 g).

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○ Methods

- MTT assay for cell viability
- Determination of ROS Generation
- Determination of blood urea nitrogen (BUN), serum creatinine, and urine lactate dehydrogenase (LDH) levels
- Determination of malondialdehyde (MDA), glutathione (GSH) levels, xanthine oxidase/dehydrogenase (XO/XD), aldehyde oxidase (AO), superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPx) enzymes activities

Results

Pretreatment of cells with the ethanol extract of the roots of *Brassica rapa* (EBR) prevented cisplatin-induced decreases in cell viability and cellular GSH content. The effect of EBR was then investigated in rats given EBR for 14 days before cisplatin administration. A single dose of cisplatin (7mg/kg, i.p.) caused kidney damage manifested by an elevation in blood urea nitrogen (BUN), serum creatinine, and urine lactate dehydrogenase (LDH) levels. Also, renal tissue from cisplatin-treated rats showed asignificant increase in malondialdehyde (MDA) production, and in the activities of aldehyde oxidase (AO) and xanthine oxidase (XO). Moreover, asignificant decrease in th eactivities of antioxidant enzymes, such as, glutathione peroxidase (GPx), superoxide dismutase (SOD) and catalase (CAT) was observed in cisplatin-treated rats versus saline-treated normal group. In contrast, rats given EBR showed lower blood levels of BUN and creatinine, and of urinary LDH. Moreover, EBR prevented the rise of MDA production and the induction of AO and XO activities. This extract also recovered the reduced activities of GPx, SOD and CAT. Taken together, our data indicate that the ethanol extract of the roots of Brassica rapa (EBR) has a protective effect against cisplatin-induced nephrotoxicity because it attenuates oxidative stress.

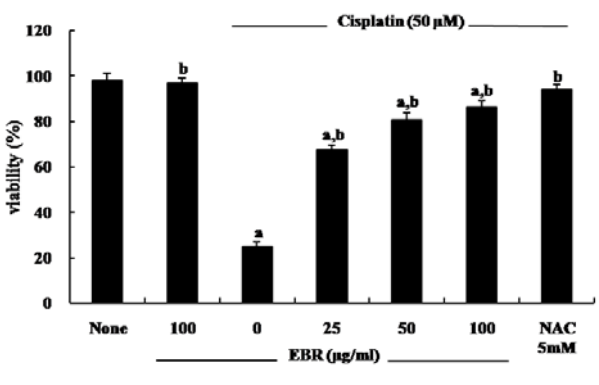

Fig. 1. . The effect of EBR on cisplatin-induced cytotoxicity in LLC-PK$_1$cells.

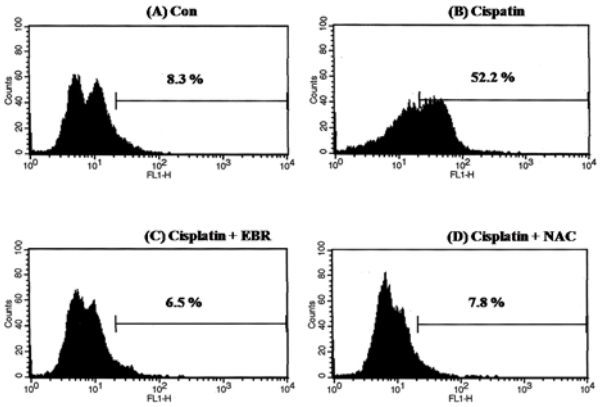

Fig. 2. The effect of EBR on cisplatin-induced ROS response in LLC-PK$_1$cells.