

Panax Ginseng Extracts Accelerate TCDD Excretion In Rats

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Introduction

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) is the most potent member of a large family of dioxin-like compounds that are ubiquitous environmental contaminants. The lipophilic nature of TCDD causes the compound to be stored in the liver, adipose tissue and breast milk. It has been reported that TCDD is not completely eliminated from human milk and blood¹. TCDD has been reported to be one of the most toxic molecules, causing acute and chronic toxicity, including chloracne, thymic atrophy and immunotoxicity, wasting syndrome, hepatotoxicity and teratogenicity in animals^{2,3}. To prevent toxicity in humans, it is important to inhibit the absorption of dioxin from the gut and to excrete the dioxin stored in the body into feces.

Korean ginseng (*Panax ginseng* C.A. Meyer) is one of the most widely used medicinal plants, particularly in traditional oriental medicine. It has a wide range of pharmacological and physiological actions. Pharmacological effects of ginseng have been demonstrated in the CNS and in cardiovascular, endocrine, and immune systems. There is also evidence from numerous studies that ginseng does have beneficial effects⁴⁻⁷. However, few studies have examined its preventative or therapeutic potential against the toxic effects of environmental contaminants such as dioxins. In this study, we investigated the effects of *Panax* ginseng extracts on the urinary or fecal excretion of TCDD in Sprague Dawley rats administered TCDD by screening the presence of dioxin in the excrements using the H4IIE-luc bioassay.

Materials and Methods

For this study, 120 male Sprague Dawley rats (8 weeks old, 190-210 g body weight) were divided into four groups: Control group, TCDD administered group, ginseng extracts administered group, co-administered group with TCDD and ginseng extracts. After being acclimatized for 1 week, The TCDD-administered group was given a single intraperitoneal dose of 25 mg of TCDD/kg body weight. The ginseng extracts-administered group received intraperitoneally 100 mg/kg/every other day for 1-month. For the co-administered group with TCDD and ginseng extracts, *Panax* ginseng extracts were intraperitoneally administered to rats at 100 mg/kg/every other day (0.5 ml/kg body weight) for 1 month after a single intraperitoneal dose of 25 mg of TCDD/kg body weight. The control group received the same amount of physiological saline every other day for 1 month. For detection of TCDD in the samples obtained from rats, luciferase assays with H4IIE-luc cells were performed using the method kindly provided by Dr. John P. Giesy, Michigan State University. The assay method has been described in detail previously⁸.

Results and Discussion

Panax ginseng extracts were intraperitoneally administered to male Sprague Dawley rats at 100 mg/kg/every other day for 1-month period after single intraperitoneal dose of 25 mg of TCDD/kg body weight. There was no significant difference in diet consumption of the control and ginseng extract-treated groups. Body weight was not affected by the ginseng extract treatment. In contrast, a significantly ($p < 0.05$) reduced body weight gain was observed after TCDD treatment. However, ginseng extracts attenuated the TCDD-induced body weight loss with statistical significance (Fig. 1).

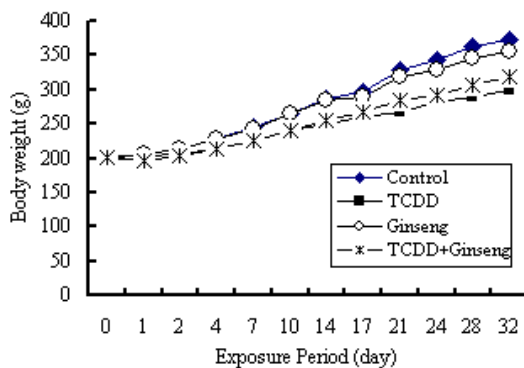


Fig. 1. Changes in the total body weight of Sprague Dawley rats in experimental group. TCDD and/or ginseng extracts were administered as described in Materials and Methods. Values shown are the mean \pm SD ($n = 5$).

The data obtained from H4IIE-luc bioassay clearly show that ginseng extracts promoted excretion of TCDD in rats on early days after treatment (Fig. 2). In serum and adipose tissue of rats co-administered with TCDD and ginseng extracts, the %-TCDD-Max. value was 2.3-fold and 1.47-fold lower than in those of the TCDD alone administered group on 2 days after treatment, respectively. Ginseng extracts decreased the presence of TCDD in serum up to day 5 after treatment. In urine of the rats co-administered, the %-TCDD-Max. value was 2.98-fold higher than in the TCDD alone administered group on 1 day after treatment. The %-TCDD-Max. value in feces of the rats co-administered was 1.25-fold and 1.44-fold higher than those in TCDD alone administered group on 1 day and 2 days after treatment, respectively. These results suggest that *Panax ginseng* extracts have promotional effect of TCDD excretion through the

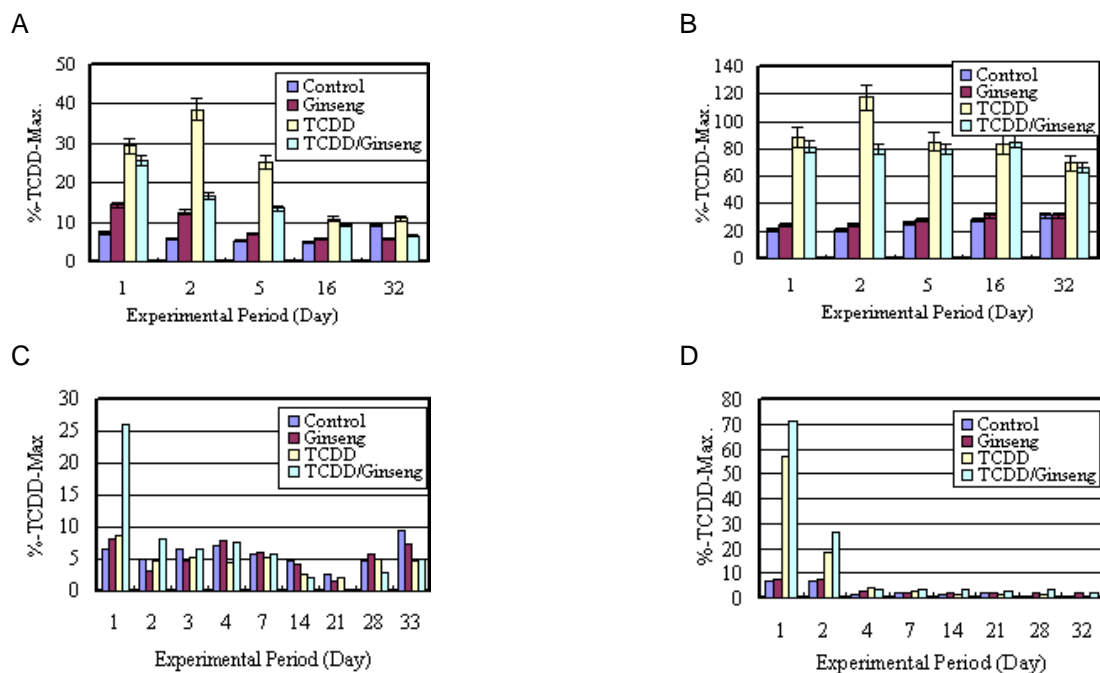


Fig. 2. Luciferase induction in the H4IIE-luc bioassay by rat (A) serum, (B) adipose tissue, (C) urine, and (D) feces. Response magnitude was presented as percentage of the maximum response observed for a 0.03 ng 2,3,7,8-tetrachlorodibenzo-*p*-dioxin/well (%-TCDD-max).

feces on early days after treatment. The excretory amount of TCDD through the feces was remarkably higher than that through the urine during 1-2 days. These findings suggest that the administration of *Panax ginseng* extracts may be useful in preventing in gastrointestinal absorption of TCDD and in promoting the excretion of the compound

already absorbed into tissues. Moreover, these findings suggest that *Panax ginseng* might be useful in the treatment of humans exposed to TCDD.

Acknowledgments

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