

Preventive effects of *Chlorella pyrenoidosa* administered orally on carbon tetrachloride-induced experimental liver injury in rats

This study was published in the scientific journal “Japanese Pharmacology & Therapeutics Vol. 47 No. 7”.

[Objective]

The preventive effects of chlorella on liver injury have been already reported in [Preventive effect of *Chlorella pyrenoidosa* on hepatic injury in rats](#). In the present study, the improving effects of chlorella were evaluated with a rat model of carbon tetrachloride (CCl₄)*-induced liver injury.

[Methods]

For preparation of rat liver injury model, 25% olive oil solution of CCl₄ was injected subcutaneously into rats once daily at 1.0 mL/kg (0.25 mL/kg as CCl₄) for 4 days. This study was performed by preparing the following 4 experimental groups consisting of 5 rats each: control group (subcutaneous injection of olive oil alone); control group treated with CCl₄ (subcutaneous injection of CCl₄ at 0.25 mL/kg); group treated with CCl₄ + oral administration of chlorella at 300 mg/kg/day; and group treated with CCl₄ + oral administration of chlorella at 1,200 mg/kg/day.

According to the experimental schedule shown in Figure 1, chlorella was orally administered for 4 consecutive days before and after initiating subcutaneous injections of CCl₄, and GOT, GPT, lipid peroxides, and triglycerides were then measured and evaluated 24 hours after the final administration of chlorella.

[Results]

Figure 2 shows the effects of chlorella on GOT and GPT levels in rats with liver injury caused by CCl₄.

CCl₄-induced increases in GOT and GPT levels were significantly inhibited by oral administration of chlorella at doses of 300 and 1,200 mg/kg/day.

Figure 3 shows the effect of chlorella on lipid peroxides in liver tissue of rats with liver injury caused by CCl₄. Lipid peroxides were measured by malondialdehyde (MDA) generated by the thiobarbituric acid-based method of Buege and Aust.

The data are not shown in this report, but no changes in serum lipid peroxides were noted after subcutaneous injections of CCl₄ or oral administration of chlorella. In contrast, the level of lipid peroxides in liver tissue was significantly increased by injections of CCl₄ and significantly reduced to the level of control group by oral administration of chlorella.

Figure 4 shows the effect of chlorella on triglycerides in liver tissue of rats with liver injury

caused by CCl₄. The data are not shown in this report, but the level of serum triglycerides was significantly reduced by injections of CCl₄ and the reduction was rarely improved by oral administration of chlorella. In contrast, the level of triglycerides in liver tissue was significantly increased by injections of CCl₄ and the increase was significantly inhibited by oral administration of chlorella at 1,200 mg/kg/day.

These results indicated that chlorella significantly inhibited GOT and GPT levels, which are generally increased in liver injury, and also inhibited the increases in lipid peroxides and triglycerides in liver tissue.

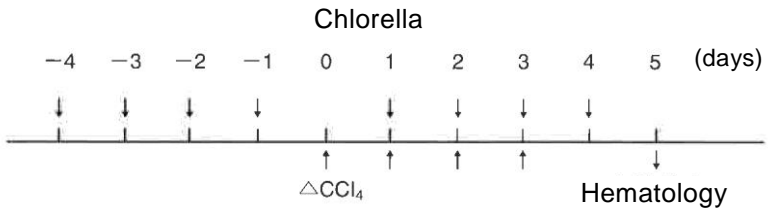


Figure 1. Timing of treatment with chlorella and carbon tetrachloride (CCl₄) and hematology

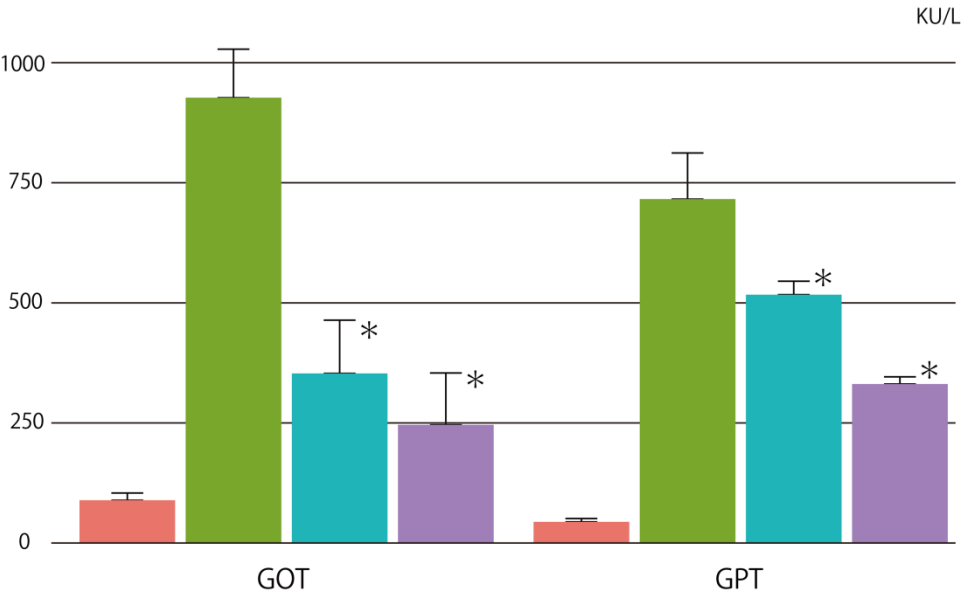


Figure 2. Results of GOT and GPT levels measured

- Control group
 - Group treated with CCl₄
 - Group treated with CCl₄ + 300 mg/kg chlorella
 - Group treated with CCl₄ + 1200 mg/kg chlorella
- *P < 0.05, vs CCl₄ group

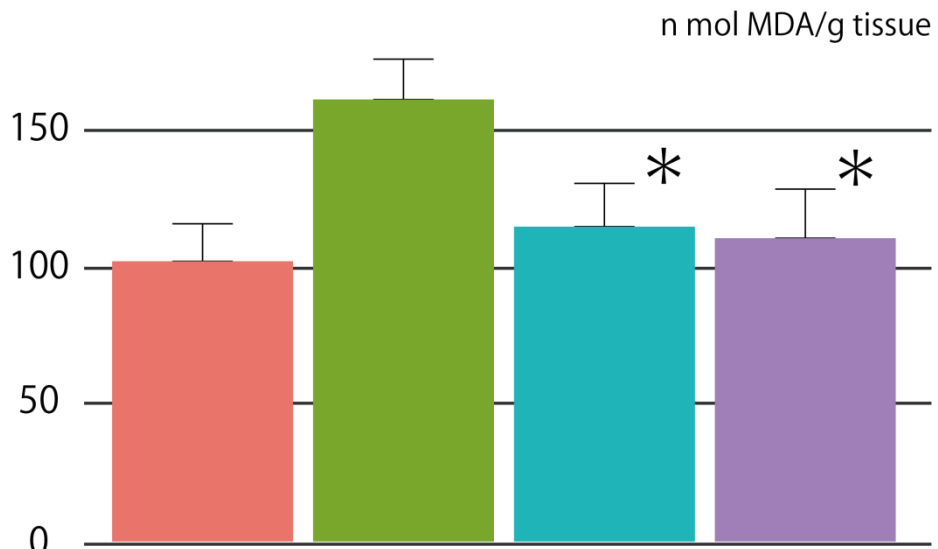


Figure 3. Results of lipid peroxides in liver tissue

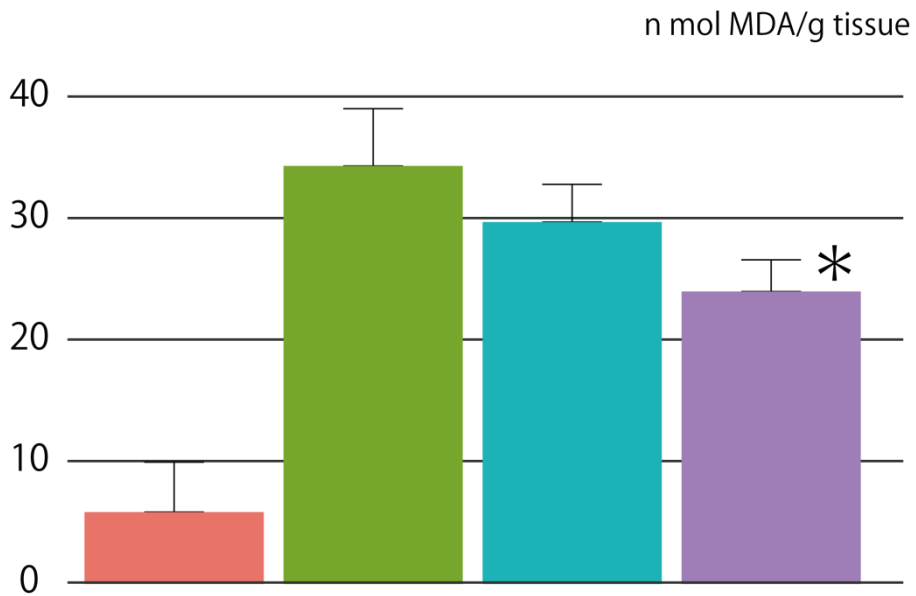


Figure 4. Results of triglycerides measured in liver tissue

- Control group
 - Group treated with CCl₄
 - Group treated with CCl₄ + 300 mg/kg chlorella
 - Group treated with CCl₄ + 1200 mg/kg chlorella
- *P < 0.05, vs CCl₄ group

Glossary

*: Carbon tetrachloride (CCl₄)

This compound has very strong hepatotoxicity and has been shown to induce hepatocellular carcinoma in animal studies with mice and rats.

<<Details>>

Publication: Japanese Pharmacology & Therapeutics (monthly) Vol. 47, No. 7 issued on July 20, 2019

Title: Preventive effects of *Chlorella pyrenoidosa* (Chlorophyceae) of oral administration on carbon tetrachloride in experimentally induced liver injury of rats

Authors: Hiroko Ito¹⁾, Masaki Fujishima²⁾, Eri Okumura²⁾, Fukuyosi Nakada³⁾, and Hitoshi Ito⁴⁾

Affiliation: 1) Laboratory of Marine Biochemistry, Graduate School of Bioresources, Mie University

2) Production and Development Department, Sun Chlorella Corporation

3) Powerful Health Foods Corporation

4) Research Institute of Mycology and Pharmacology

The data included in this report have been published in academic journals or meetings and are not intended to promote products.

[Inquiries about this study report](#)