

Hepatic Impairment Inhibiting Effect of BioBran

Interview with Dr. Hiroo Sanada (Professor of Department of Bioproduction Science, Faculty of Horticulture, Chiba University)

The oligosaccharide lactulose is clinically used to improve symptoms of hepatic impairment. Because of this, oligosaccharides have been considered possibly useful for the prevention of hepatic impairment. In fact, experimental studies with rats showed that oligosaccharides have a hepatic impairment inhibiting effect. Dr. Hiroo Sanada (Professor of Biochemistry, Department of Bioproduction Science, Faculty of Horticulture, Chiba University) has focused on arabinoxylan, which is the main component of hemicellulose, a plant-derived polysaccharide, and studied the hepatic impairment inhibiting effect of BioBran, an arabinoxylan derivative obtained through biological modification by treating rice bran-derived arabinoxylan with enzymes from *shiitake fungi*. The study showed that BioBran has a preventative effect on galactosamine-induced hepatic damage, although the mechanism of the action is unknown. He intends to study its effect on different types of hepatic damages. Here, Dr. Sanada is interviewed about the effect of BioBran on hepatic impairment.

Dr. Sanada

Effects of BioBran confirmed in different experimental hepatic damages

— Why did you begin to study the effect of BioBran on hepatic impairment?

Dr. Sanada: There are two main reasons. First, my predecessor Dr. Yuko Ayano (professor emeritus at Chiba University) found that hemicelluloses, plant-derived polysaccharides, have a preventative effect on D-galactosamine-induced hepatic damage. At that time 15 years ago, however, the effect could not be scientifically confirmed, because the reproducibility was very low.

Second, the disaccharide lactulose has been used in the clinical improvement of symptoms of hepatic impairment, suggesting the possible usefulness of oligosaccharides for prevention of hepatic impairment. A variety of oligosaccharides were studied for their preventative effects on galactosamine-induced hepatic damage in rats. Among them, lactulose, galacto-oligosaccharide, and raffinose were shown to have a preventative effect. BioBran is a derivative of arabinoxylan, which is the main component of the hemicellulose contained in grain. In other words, it can be said that BioBran mainly consists of oligosaccharides from arabinoxylan. From these, I inferred that BioBran has an inhibitory effect on galactosamine-induced hepatic damage.

— What about the actual effects of BioBran on hepatic damages?

Dr. Sanada: Our laboratory has studied the preventative effects of food ingredients on experimental hepatic damages, from a viewpoint of disease prevention with food rather than treatment of diseases. As with other oligosaccharides, first, BioBran was mixed in feed and given to rats for 1 week before observing galactosamine-induced hepatic damage. However, the group given BioBran had no decreased serum transaminase activity.

As BioBran had been known to activate NK cells, I thought that the NK cell activity had probably increased when galactosamine was administered, and the increased activity enhanced cell damage by galactosamine administration.

Thus, I gave BioBran 1 hour before administration of galactosamine. As a result, galactosamine-induced hepatic damage was significantly inhibited (Figure 1). The NK cell activity had not yet increased at the time of galactosamine administration in this experimental setting. This suggested that the mechanism of the action of BioBran may be different from increased NK cell activity. The inhibitory effect of BioBran was observed after both oral and intraperitoneal administrations.

Next, the inhibitory effect on acetaminophen-induced hepatic damage was evaluated in the same way. BioBran had the same inhibitory effect on acetaminophen-induced hepatic damage (Figure 2).

Then I made the same experiment using α -naphthylisothiocyanate, known to cause cholestatic hepatic damage. BioBran had no inhibitory effect on this type of hepatic damage. The effect on carbon tetrachloride-induced hepatic damage is under study.

Possible prevention of acute hepatic impairment

— What do you think about the results of these experiments?

Dr. Sanada: Galactosamine-induced hepatic damage mimics acute viral hepatic impairment in histopathology and clinical conditions, and is used in experiments as a model of the disease. Thus, I think that BioBran may be useful in the prevention of such acute hepatic impairments.

Generally, the immune system is largely involved in viral hepatic impairment. Galactosamine-induced hepatic damage is also reduced to some extent by inhibiting macrophage activity, suggesting the involvement of the immune system.

In addition to this, galactosamine as well as acetaminophen is considered to induce weakness in the liver by causing a shortage or inactivation of crucial components for hepatocytes.

It remains unknown what ingredients of BioBran inhibit the development of hepatic damage and what the mechanism of the inhibition is. At the early stage of hepatitis viral infection, increased NK cell activity has the advantage of preventing hepatic impairment because it inhibits viral growth by destroying infected cells.

Combination of different ingredients provides effective prevention

— Please talk about the future prospects of your study.

Dr. Sanada: I think that BioBran has two ingredients, one that activates NK cells to suppress the growth of hepatic viruses and one that inhibits hepatic impairment and weakness in hepatocytes regardless of NK cell activation, in terms of the prevention of hepatic impairment. Of course, these ingredients might be the same.

Our recent study showed that galactosamine-induced hepatic damage was inhibited by giving rats feed mixed with oligosaccharides prepared through enzymatic hydrolysis of hemicellulose from grain. Probably no activation of NK cells occurred in this case. I think that the good use of these ingredients could facilitate the effective prevention of different types of hepatic damages.

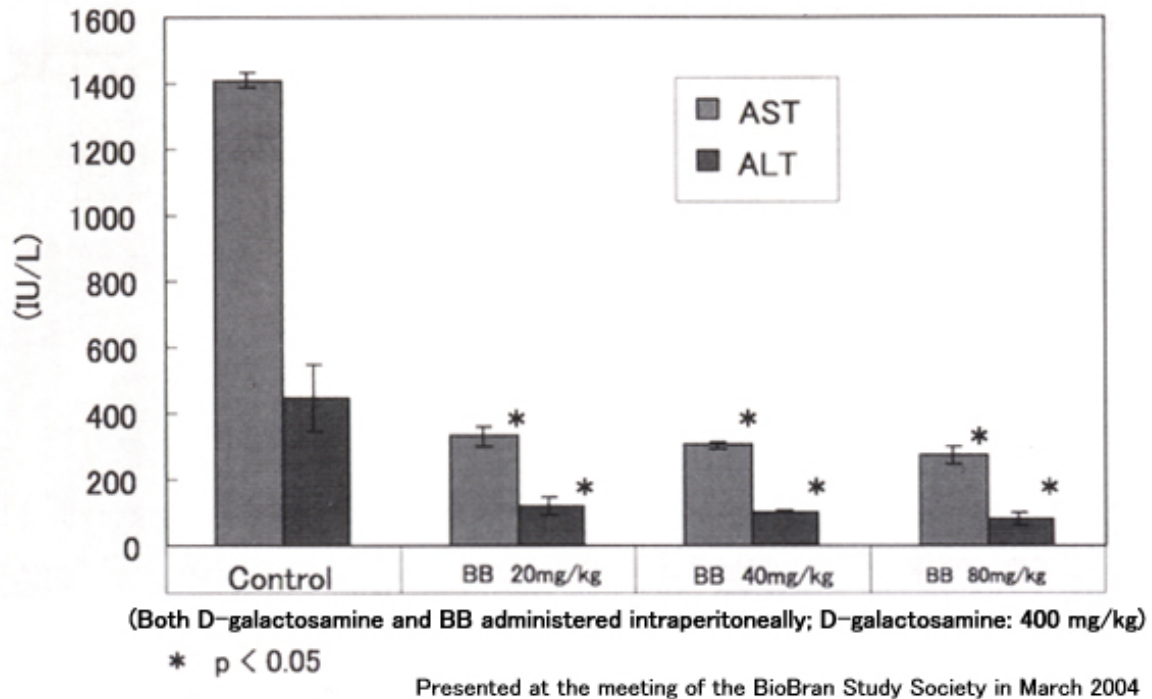


Figure1 Effect of BioBran (BB) on D-galactosamine-induced hepatic damage in rats

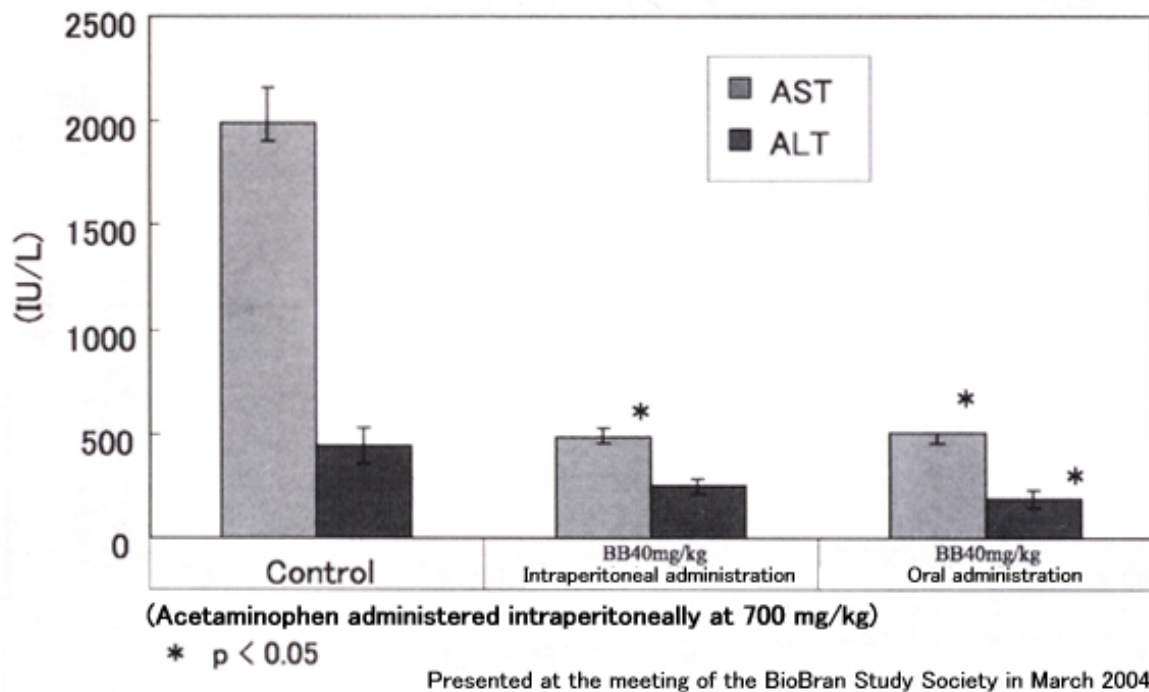


Figure2 Effect of BioBran (BB) on acetaminophen-induced hepatic damage in rats