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生命科学

Oral administration of Lactic acid bacteria prevents inflammation and in mice model of non-alcoholic steatohepatitis (NASH)

TECHNOLOGY SHOWCASE

■ Background

Non-alcoholic steatohepatitis (NASH) is a detrimental process of diabetes to develop into hepatocellular carcinoma. This inflammatory disease is becoming increasingly popular among obese population associated with high-fat diet, especially in developed countries.

In the present study, we show that oral administration of a lactic acid bacterium prevents inflammation and steatosis in murine liver, using an experimental model of NASH.

■ Results and Discussion

1. Effects of oral-C60 for 3 weeks on NASH-HCC mice

1.1 NAFLD (nonalcoholic fatty liver disease) activity score

Oral administration of C60 for 3 weeks improved NAFLD activity score significantly including steatosis, lobular inflammation and hepatocellular ballooning.

1.2 Effects of C60 oral administration for 3 weeks on inflammation

Inflammatory and anti-inflammatory biomarkers and mediators in liver and MLN cells were examined. Timp-1 is up-regulated at steatotic phase. Collagen Type 1 and 3 are up-regulated prior to fibrosis. IL-10 gene expression was significantly up-regulated in cells from mesenteric lymph nodes (MLN) at steatotic phase in the group of mice fed C60.

1.3 Effects of Biochemical analysis in serum

GOT, GPT and LDH are related with inflammation in liver and metabolism syndrome. The results showed that GOT, GPT and LDH decreased.

2. Effects of oral-C60 for 5 weeks on NASH-HCC mice

2.1 NAFLD (nonalcoholic fatty liver disease) activity score

NAFLD activity score did not change after HFD feeding for 5 weeks.

2.2 Effects of C60 oral administration for 5 weeks on inflammation

After oral administration of C60 for 5 weeks, mRNA expression of collagen Type 1 and 3, and Timp-1 were decreased significantly that correlated with the results from administration for 3 weeks. In addition, expression of Tnf-α and Ccl-2 decreased significantly. Interestingly, C60 induced high level of mRNA expression of IL-10 in liver. Furthermore, Analysis of tissue lymphocytes revealed that oral administration of C60 significantly regulates infiltration of neutrophils to the inflamed liver.

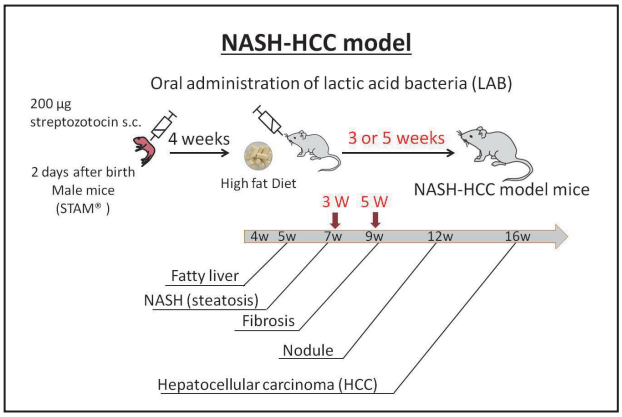
2.3 Effects of Biochemical analysis in serum

GOT, GPT and LDH were decreased significantly in C60 treated mice for 5 weeks. These results are related with GOT, GPT and LDH decreasing in C60 treated mice for 3 weeks. We suggested that C60 oral administration could prevent inflammation in liver, and improved metabolic function.

■ Conclusion

Non-alcoholic fatty liver disease (NAFLD) activity score including steatosis, lobular inflammation, and hepatocellular ballooning is significantly improved by the oral administration of C60 in STAM mice. The level of IL-10 in liver and MLN of C60-fed mice was up-regulated. Inflammatory signature such as expression of TNF-α, Timp-1, Collagen and Ccl-2 was suppressed significantly after 5 weeks. Accordingly, analysis of tissue lymphocytes revealed that oral administration of C60 significantly regulates infiltration of neutrophils to the inflamed liver. Furthermore, tissue and cellular damaged markers reflected by GOT, GPT and LDH decreased significantly.

We are currently examining Hepatocellular carcinoma by NASH-HCC model that long-term oral administration of Lactic acid bacteria may lead to establish a novel method to prevent Hepatocellular carcinoma.



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