

9. *Lactiplantibacillus plantarum* Isolated from Deep Ocean Water Protect the Intestinal Epithelial Barrier

°Xiaozhen Diao¹, Katsuhisa Yamada^{1,2}, Yuji Shibata², Chiaki Imada¹

(1 Tokyo University of Marine Science and Technology, 2 DHC Corporation)

1. Introduction

The intestinal epithelial barrier integrity is known as the crucial defense against pathogens or their excretions from the external environment in the human body. Tight junctions (TJs) taking up the most apical surface of the intercellular space of intestinal epithelium function as a barrier. Recently, some species of lactic acid bacteria (LAB) isolated from the probiotics or their fermentative products have been reported to have protective effects on intestinal epithelial barrier against oxidative damage induced by H₂O₂, however, there were few reports related with LAB isolated from the deep ocean water (DOW). The aim of this study is to investigate the effect of the culture supernatant (CS) of *Lactiplantibacillus plantarum* strain BF1-13 isolated from DOW (the isolate) on the degradation of the intestinal epithelial barrier function by H₂O₂ treatment. Furthermore, the elucidation of active substance included in the CS was investigated.

2. Methods

The isolate from bag filters used in the DOW pumping facility at Izu-Akazawa, Ito city in Shizuoka Prefecture. The isolate was compared with three other strains of LAB, which were *Lactiplantibacillus plantarum* strain H-6, *Lactobacillus delbrueckii* KM2 and the standard strain of *Lactiplantibacillus plantarum*

JCM11125, on the ability of cell-growth and production of lactic acid (LA) by using MRS medium. The effect of the CS on the degradation of the intestinal epithelial barrier function by H₂O₂ treatment was investigated by the transepithelial electrical resistance (TEER) and the expression of TJs related proteins. The effect was compared to the standard strain. Furthermore, the effect of authentic LA which was major substance in the CS was also investigated by the same methods.

3. Results & Discussion

In this study, it was suggested that strain BF1-13 was the best strain because of its highest ability of cell-growth and production of LA. *In vitro* study suggested that the CS of the strain and its standard strain protected the intestinal epithelial barrier function against the degradation by H₂O₂ treatment. In a comparative experiment, the standard strain showed almost the same effect, which suggested that LA contained in the CS of LAB might have the protective effect.

Therefore, LA itself was tested on the assay and it showed the same effect as the CS of strain BF1-13. As a result, it suggested that LA produced by LAB is one active substance for the protection of the intestinal epithelial barrier. Further studies using other LAB strains will be conducted in the near future.