

Studies on Food Functionality of Halotolerant Lactic Acid Bacterium *Tetragenococcus halophilus* from Marine Products

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Summary

It is well known that the halotolerant lactic acid bacterium *Tetragenococcus halophilus* exists in fish sauce, soy sauce, miso. Recently, some studies as for the functionality of the antiallergic effect of *T. halophilus* from soy sauce were reported. On the other hand, the working of the microorganism in *shiokara* has been assumed to be smaller compared with the digestion enzyme. In a current study, we confirmed a lot of *T. halophilus* existed in *saba-shiokara* which had seemed aseptic because of its high salt level. Therefore, it is important to study the working of the microorganism in order to develop the new fishery fermented food that have the effect of probiotics. The purpose of this study is to clarify various characteristics about *T. halophilus* from marine products. 9 samples and 11 samples of 15% NaCl tolerant bacteria were isolated from 12 commercial *saba-shiokara* and 15 internal organs of mackerel, respectively. Histamine production of 30 isolated bacteria which were cultured in histidine broth for 10 days was analyzed. As a result, 28 strains produced the histamine of 1,100-2,300 ppm, and these were defined as histamine-producing strains. The other two strains were defined as non-histamine-producing strains because of low histamine concentration. The physiological property of 30 strains was also estimated. All strains showed Gram positive cocci, catalase negative. In addition, they could grow on 18% NaCl-MRS agar and dissolved calcium carbonate. From these results, 30 strains were decided their belonging to the *Tetragenococcus* genus. Based on Blast analysis, both strains A124 (histamine-producing strain) and A114 (non-histamine-producing strain) showed significant identity (99%) with *T. halophilus* respectively. According to the relation between pH and the growth of the A124 strains on 15% NaCl-BPG liquid, there was the threshold for pH that the A124 strains could grow between 5.0-5.5. The 16S rDNA of *T. halophilus* could be amplified from internal organs of all 5 mackerels. Therefore it was suggested that *T. halophilus* exists universally in the internal organ of mackerel. Besides the *hdcA* gene was detected in 3 samples out of 5 internal organs of mackerel. Therefore it was suggested the *hdcA* gene exists in *T. halophilus* in the internal organ of mackerel. Regulation of the histidine decarboxylase gene *hdcA* in *T. halophilus* was investigated. The level of expression of *hdcA* under various pH conditions was the smallest in pH 5.5, and pH 5.0 was secondly smallest. The level under pH 5.0 was approximately 1.6 times pH 5.5. The level under pH 4.0, pH 6.0 was approximately 8.5, 4.1 times respectively pH 5.5. Therefore it was concluded that keeping the pH of *saba-shiokara* within the range of 5.0-5.5 is effective in order to suppress the *hdcA* gene expression of A 124.