

International Conference on **Aquaculture & Fisheries** July 20-22, 2015 Brisbane, Australia

Effects of cellulase hydrolysis and probiotic fermentation on the functionality of *Chlorella*

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The utilization and bioactive compounds of algal polysaccharides are much concerned in the pharmaceutical, food, and textile industries. However, their utilizations are limited because of their high resistance of cellulosic cell walls. Rigid cell walls of *Chlorella* species have been shown to contain mannose as a major sugar component. This study aimed to investigate the effects of cellulases and proteases hydrolysis and subsequently LAB fermentation on the release of nutrients of *Chlorella*. The suppression on the pro-inflammatory factors against lipo polysaccharide induced phagocytic cells by the hydrolyzed *chlorella* and LAB fermented hydrolysates were also evaluated. According to the data obtained, hydrolysis with cellulase and protease at 50°C made the lutein, chlorophyll, reducing sugar, and peptides released, suggesting obvious lysis of cell walls occurred. When *chlorella* hydrolysate was further fermented with *Lactobacillus johnsonii* BCRC 17010 or *L. plantarum* subsp. BCRC 10069 at 37°C for 24hr, the essential amino acids increased from 512 to 1475-2337 mg/100 g. More than 75% of NO and 66% of O²- productions in LPS-RAW 264.7 cells were inhibited by cellulase/protease hydrolyzed and 24hr *L. plantarum* fermented hydrolysate. Both *L. johnsonii* and *L. plantarum* fermented hydrolysates could depress the tumor necrosis factor (TNF-α) and interleukin 6 (IL-6). In conclusion, lysis of *chlorella* cell walls by cellulase and proteases made the lutein, chlorophyll, reducing sugar, and peptides released. Cellulase/protease hydrolyzed *chlorella* and further 24hr *L. plantarum* fermented hydrolysate could increase the essential amino acids, depress the tumor necrosis factor (TNF-α) and interleukin 6 (IL-6) and inhibit NO and O²- productions in LPS-RAW 264.7 cells, suggesting that hydrolysis and further LAB fermentation can improve the nutrition value of *Chlorella* and subsequently be used in healthy food.

Biography

Shann-Tzong Jiang earned his Master degree from Tokyo University of Fisheries, Japan and PhD from University of Rhode Island, USA. He is a Fellow of the International Academy of Food Science & Technology and National Endowed Chair Professor of the Ministry of Education of Taiwan. He is currently working at the Department of Food Science, National Taiwan Ocean University, and at Providence University as Senior Vice President. He has published more than 170 papers in reputed journals and has been serving as Editorial Board Member of several reputed journals.

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