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Bioremediation of Environmental Pollutions by Glycosylation with Immobilized Marine Microalga

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Summary

Bisphenol A has been listed among "chemicals suspected of having endocrine disrupting effects" by the World Wildlife Fund, the National Institute of Environmental Health Sciences in the USA and the Japanese Environment Agency. The biphenyl compounds exhibited estrogenic activity in bioassays. Bisphenol A is widely used to manufacture polyacrylates, ether resins, phenol resins, insecticides, agricultural chemicals, pharmaceuticals, and coatings, and its residues are released as pollutants into rivers and seas. In the case of bisphenol A, worldwide production capacity was estimated about 1,100 million pounds. From the viewpoint of seawater pollution control, metabolism of bisphenol A by marine microalgae is of importance.

This study focused on the metabolism of bisphenol A by cultured and immobilized marine microalga of *Amphidinium crassum*. Biotransformation product was isolated from the cultured cells of *A. crassum*, which had been treated with bisphenol A. Potentially glucosylated product was obtained, and its chemical structure was determined on the basis of their FABMS, ^{1}H and ^{13}C NMR, H-H COSY, C-H COSY, and HMBC spectra as bisphenol A β-D-glucoside. The glucosylation activity of immobilized *A. crassum* cells was enhanced at 2% sodium alginate concentration. Use of immobilized *A. crassum* cells improved the glycosylation activity, and the amount of glycosides was enhanced 1.3 fold in comparison with the case of biotransformation with cultured *A. crassum* cells.

From the viewpoint of seawater pollution control, glycosylation of bisphenol A by immobilized marine microalga is important and environmentally friendly.