Short Communication

An Acute Toxicological Study on Three *Synechococcus* Strains (Cyanobacteria) Isolated from a Red Tide in Lake Biwa

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Maeda et al.¹⁾ observed unicellular fluorescent picoplanktons (0.4-1.5 μ m in diameter) composing significant parts of phytoplanktons in the North Basin of Lake Biwa during early summer in 1989 and 1990. Sometimes they formed blooms with a maximum number of 10^6 cells/ml. Three strains (colors of the cultures: pink, green and brown) were isolated from the bloom and classified by using epifluorescence microscopy, electron microscopy and fluorescence emission spectroscopy. As the result, they were photosynthetically active with ringlike thylakoids but without nuclear envelope and were classified in *Synechococcus* group in cyanobacteria.

The water of Lake Biwa is very important for the sources of daily drinking water for the people living near the lake and river derived from it, including people living in the big cities such as Kyoto and Osaka. No toxicological study on these organisms, however, was reported, although Mitsui et al. observed its hemolytic activity using

another strain of marine origin²⁾. Therefore, we report here an acute toxicological study on *Synechococcus*.

Three strains of *Synechococcus* isolated from Lake Biwa were cultivated by the method described by Maeda et al.¹⁾.

Sixty ddY female mice (3 weeks of age, Nippon LLC) were used for toxicological study after 1 week of observation. They were kept in plastic cages (5 mice in a cage) in an air conditioned animal room (23°C, 40% humidity) of Nara Medical University. Two milliliters of the suspension containing 2×10^{10} cells of each strain, which had been concentrated by centrifugation of the culture (2×10^8 cells/ml), were administered orally (po) or intraperitoneally (ip) into mice of 5 experimental groups (10 mice/group) once a day for three days (ip-administration of brown strain was not done). Two milliliter of the culture medium were administered in the mice of 2 groups (5 mice/group) as a control. The mice were weighed, and their physical status such as hair condition was observed for 2 weeks after the administration and they were all autopsied by ethyl ether. Their

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Table 1. Histological findings of female ddY mice administrated with strains of *Synechococcus*.

Histology	No. of mice						
	oral administration				intraperitoneal administration		
	pink 10	green 10	brown 10	control 5	pink 10	green 10	control 5
Lung							
atelectasis		1					
congestion			2				
Liver							
congestion						1	
cell infiltration						1	
Stomach							
hyperplasia					1		
Thymus							
congestion			1				

organs were fixed in 10% formalin solution, embedded in paraffin (lung, heart, liver, stomach, brain, pancreas, thymus, small and large intestine, kidney, bladder, uterus, ovary, adrenal glands, skin, esophagus, mammary glands, salivary glands and bone marrow). They were sectioned in 2–3 μm by a microtome. The sections were stained by hematoxyline and eosin routinely for the microscopic observation.

As shown in Table 1, no common nor severe pathological findings was observed in the treated mice.

With regard to body weights of the experimental animals, no difference was observed between those of the control groups and the *Synechococcus*-administrated groups (data not shown). No distinct alterations in the physical condition of the mice were also found throughout the experiment.

From these results, it was concluded that no acute toxicity was found in these *Synechococcus* isolated from Lake Biwa. Further studies on subacute and chronic toxicity and carcinogenicity are necessary for the understanding of the toxicity of these organisms.

References

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