

Identification and Hepatotoxicity of Microcystin-LR Isolated from *Microcystis aeruginosa* Kütz. in Huay Yuak Reservoir Chiang Mai Province

Soraya Aroonvilairat¹, Werawan Ruangyuttikarn^{1*}, Jeeraporn Pekkoh², Yuwadee Peerapornpisal², Xiaoyun Shen³, Wasantha Wickramasinghe³ and Glen Shaw³

¹Department of Forensic Medicine, Faculty of Medicine, Chiang Mai University, Chiang Mai 50200, Thailand

²Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand

³School of Public Health, Griffith University, and CRC for Water Quality and Treatment, Meadowbrook Qld, 4031, Australia

*Corresponding author. E-mail: wruangyu@mail.med.cmu.ac.th

ABSTRACT

Surface cyanobacterial blooms were collected from Huay Yuak reservoir in Chiang Mai, Thailand and extracted for microcystin identification and analysis. The hepatotoxicity of microcystin was investigated on primary cultured rat hepatocytes, using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. *M. aeruginosa* was isolated and cultured in order to investigate the relationship between the intracellular and the extracellular microcystin-LR concentrations. The microcystin content was determined by high-performance liquid chromatography. The results showed that microcystin-LR was the main component of the surface cyanobacterial blooms and was quantitated as 0.14 mg/g of dried cells. The confirmatory identification of microcystin-LR was achieved, using an optimized high-performance liquid chromatography-tandem mass spectrometry system. Microcystin-LR exhibited toxic effects on primary cultured rat hepatocytes with an IC₅₀ of 10.34 ng/mL at 24 h incubation. *M. aeruginosa* cultures showed that the intracellular microcystin-LR concentrations correlated negatively with the extracellular microcystin-LR concentrations. The intracellular microcystin-LR concentrations ranged between 120.09-458.59 µg/g of dried cells while the extracellular concentrations ranged between 0.67-10.46 µg/mL. This study indicated that microcystin-LR was the main toxic component found in cyanobacterial samples from Huay Yuak reservoir, using a variety of techniques.

Key words: Microcystin-LR, Identification, Hepatotoxicity, Huay Yuak Reservoir