

Mycosporine-like amino acids as natural skin care ingredients: Production development and investigation of biological functions

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Mycosporine-like amino acids (MAAs) are a group of water-soluble, low-molecular-weight secondary metabolites known as a natural biological sunscreen. Since it has been suggested that MAAs possessed multiple bioactivities for health and beauty, a universal production process of MAAs from biomass is an important subject. Here, we developed a broadly applicable and cost-effective method for the purification of MAAs from cyanobacterial cells. Because of their photoautotrophic property, the cyanobacteria, which are photosynthetic microorganisms, are of interest as a natural source of useful compound production. The purification method presented here was designed and developed by using a halotolerant cyanobacterium *Halotheca* sp. PCC7418, which could produce a rare MAA, mycosporine-2-glycine (M2G). A three-step separation process using low pressure liquid chromatography yielded high-purity M2G. Moreover, the most common MAAs, shinorine (SHI) and porphyra-334 (P334) could also be successfully purified from commercialized sunscreen reagent Helioguard®365 by utilizing this method. The experimental parameters obtained in this study might allow for a scale-up of the MAA production process for future commercialisation. From the viewpoint of application as skin care ingredient, antioxidative activities of purified MAAs were evaluated by the 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) assay. Inhibitory activities of these MAAs toward tyrosinase, which is known to be an enzyme involved in melanin biosynthesis, was also investigated.