IN VITRO SAFETY ASSESSMENT OF MICROALGAL AND CYANOBACTERIAL STRAINS OF INTEREST AS FOOD INGREDIENTS

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Microalgae (including cyanobacteria) have since long been recognized as potential sources of food, due to their balanced biochemical composition and high nutritional value. The general objective of the present research was to evaluate the toxicity of 13 microalgal strains, selected as potential food ingredients, in two in vitro models: human dermal fibroblasts and Artemia salina.

Methanolic and aqueous extracts of the biomasses were tested on A. salina at concentrations ranging from 0.024 to 25 g L⁻¹. Only aqueous extracts (from 0.5 to 12.5 g L⁻¹ of extracted biomass) were tested on fibroblasts. The methanolic extracts of Arthrosira platensis M2, Nostoc commune var. sphaeoides F6M-C117, Chlorella vulgaris (Roquette), Chlorella vulgaris (Allma), Tetraselmis suecica F6M-M33, Nannochloropsis oceanica F6M-M24 and Porphyridium cruentum F6M-M46 were found to have no toxicity on A. salina. The methanolic extracts of Chlorella sorokiniana F6M-M49, Phaeodactylum tricornutum F6M-M40 and Tetraselmis suecica F6M-M33 grown in nutrient replete medium showed toxicity only at the highest concentrations (12.5 - 25 g L⁻¹ of extracted biomass), while the extracts from Alga Klamath (Aphanizomenon flos-aquae bloom). Isochrysis aff. galbana T-ISO F6M-M36 and Chlorella sorokiniana IAM C-212 were toxic even at low concentrations (0.8 g L⁻¹ of extracted biomass). On A. salina, the aqueous extracts of N. commune var. sphaeoides F6M-C117, N. oceanica F6M-M24, P. cruentum F6M-M46 and all the Chlorophyta showed no toxicity. I. aff. galbana T-ISO F6M-M36, A. platensis M2 and P. tricornutum F6M-M40 were found to be toxic at 12.5 and 25 g L⁻¹ of extracted biomass. The extract from A. flos-aquae was found to be toxic at concentrations higher than 0.8 g L⁻¹ of extracted biomass.

On fibroblasts, C. vulgaris (Roquette), C. vulgaris (Allma), starved T. suecica F6M-M33 and P. cruentum F6M-M46 showed no cytotoxicity compared to the control; on the contrary, all the other strains exhibited signs of cytotoxicity, mainly at the highest concentrations. Artemia and fibroblasts are valuable models for preliminary screening of toxicity. However, results obtained with these in vitro screenings need to be confirmed with in vivo systems.

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