MICROALGAE AND SEAWEED SPECIES AS PROMISING SOURCES OF NUTRACEUTICALS FOR METABOLIC DISEASES

Javier Sanz[1], Ana Catarina Fonseca[1], Marielle Frank[1], Rita Pimenta[1], Filipe Henriques[1], Maria Silva[1], Diogo Martins[1], and Ralph Urbatzka[*†1]

[1]Centro Interdisciplinar de Investigação Marinha e Ambiental = Interdisciplinary Centre of Marine and Environmental Research [Matosinhos, Portugal] – Portugal

Résumé

Novel molecules to fight metabolic diseases are urgently needed, and algae are important resources for valuable compounds with human health benefits (e.g. polyunsaturated fatty acids, pigments, vitamins). The aim of this research was to screen extracts from microalgae and seaweeds using phenotypic assays with zebrafish larvae relevant for metabolic diseases (obesity and diabetes).

The results revealed that extracts from *Chlorella vulgaris* (grown either autotrophic or heterotrophic) and from *Chlorococcum* sp. reduced the appetite $>$ 40% in zebrafish larvae. Aqueous extracts from *Tetraselmis chuii* stimulated glucose uptake at 40%, and lipidic extracts of both *Pavlova gyrans* and of *Phaeodactylum triocornutum* reduced neutral lipid level at 50%. *Nanofrusturum shiloi* and *Nannochloropsis oceanica* were bioactive in beta-cell regeneration. The macroalgae *Porphyra dioica* reduced neutral lipids at 40%, while *Codium tomentosum* increased glucose uptake at 50%. Promising extracts were submitted to metabolite profiling with LC-MS/MS and the GNPS platform to receive insights into responsible compounds. Some unsaturated fatty acids (oleic acid, linoleic acid, palmitoleic acid) and nucleosides (adenosine, methylthioadenosine) were selected from those clusters, and confirmed their appetite reducing activity at 5 – 20 μM. The analysis of mRNA expression of appetite regulating genes demonstrated increased *pomc* and *cartp* mRNA, involved in anorexigenic, neuroendocrine signaling of appetite. The identification of the responsible compounds from the other bioactive extracts is ongoing.

In summary, promising activity was observed for various microalgae and seaweed species, which could lay the ground for the development of nutraceuticals for the treatment of obesity and diabetes.

Mots-Clés: microalgae, seaweed, obesity, diabetes, bioactive compounds, nutraceuticals, zebrafish

*Intervenant

†Auteur correspondant: rurbatzka@ciimar.up.pt