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Bioactivity screening of marine cyanobacteria for the isolation of novel compounds for hepatic steatosis

GABRIELA MOREIRA[1], FILIPA ROSA[2], VITOR VASCONCELOS[2,3], AND RALPH URBATZKA[2]

1-ESS, Escola Superior de Saúde do Politécnico do Porto
2-CIIMAR, Centro Interdisciplinar de Investigação Marinha e Ambiental
3-FCUP, Faculdade de Ciências, Universidade do Porto

Introduction: Nonalcoholic fatty liver disease (NAFLD) is a common chronic liver disease and effective therapeutics has been widely study. Cyanobacteria, previously known as blue-green algae, are known to produce many secondary metabolites including toxins, with applications to the pharmaceutical industry. The aim of this study is to investigate the effect of extract from cyanobacteria to reduce lipid accumulation in a model of hepatic steatosis using HepG2 cells in vitro.

Material and methods: HepG2 cells were treated with 62 µM oleic acid (OA) to induce lipid accumulation and co-exposed to cyanobacterial extracts. 6 hours later, cells were stained with Nile Red (1:400) to quantify lipid levels in cells in a fluorescence plate reader. Subsequently, sulforhodamine B (SRB) assay was performed to the same cells to measure cellular protein content that indicates the toxicity of the compounds. To validate our protocol, we exposed HepG2 cells to resveratrol (REV) at 25 and 50 µM. Extraction of cyanobacterial biomass was performed with hexane, ethyl acetate and methanol, resulting in fractions A, B and C respectively. These fractions were prepared in dimethyl sulfoxide (DMSO) in a concentration of 10 mg/mL.

Results and conclusions: In the present study, an assay was optimized to quantify the reduction of lipid accumulation in HepG2 cells. REV reduced the lipid level about 20%, to similar values as described in the literature. Extracts from 27 cyanobacteria strains were tested and positive results were obtained in some fractions from different cyanobacteria. In the ongoing work, we intend to isolate novel bioactive compounds to elucidate their structures.

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Key words: Steatosis; Cyanobacteria; HepG2 cells; Bioactive compounds