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Bioactivities of *Fucus spiralis* dichloromethane fractions and their triglyceride constituents

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Abstract: Three fractions of *Fucus spiralis* dichloromethane extracts (2.2.3, 2.2.10, 2.2.15) were tested for their reducing power, DPPH scavenging, anticholinesterasic and antitumour activities and were further fractionated to obtain pure compounds. Four compounds were isolated from the fractions, two of which were triacylglycerols (2.2.3.1 and 2.2.3.2) and two other (2.2.3.3 and 2.2.13) whose structure was not possible to clarify because the samples had too many contaminations. This was the first time that those compounds were isolated in this species. None of the fractions presented any of the activities tested. Concerning antitumour activity, the actual activity from the fractions couldn't be assessed, since the cell lines used acquired chemoresistance prior to the tests.

1- Introduction

Fucus spiralis Linnaeus, known in Azores as "Fava-do-mar" is an edible brown macroalga (Ochrophyta (Phaeophyceae)) which can be found on rocks at upper intertidal levels, where it forms a patchy zone (Neto *et al.,* 2005). It is scattered throughout Europe, Azores and Canary Islands, North America, Morocco and Western Sahara (Guiry & Guiry, 2014). In the Azores, it is the only member of the genus *Fucus* that can be found and, traditionally, the receptacles have been eaten as a local delicacy (Neto *et al.*, 2005). Nutritionally, it contains 9.7% of protein, 5.2% of lipids and 17.6% of carbohydrates (% of dry weight, Paiva *et al*., 2014).It is also very rich in crude fiber content, composing 63.9% of the dry weight of the algae (Patarra *et al.*,2011). Regarding its mineral composition, the same authors (Paiva *et al*., 2014) showed that, in 100g of dry weight of the algae, there are 1429 mg of sodium, 975.9 mg of potassium, 163.2 mg of magnesium and 118.1 mg of calcium. This species is also a rich source of polyunsaturated fatty acids (PUFA), containing about 430 mg/kg (dry weight), with eicosapentaenoic acid (EPA C20:5 ω-3) being the most abundant (Silva *et al.,* 2013). Saturated fatty acids (SFA) are also abundant (875 mg/kg dry weight), being the ones with 18 carbons the most found. Regarding to monounsaturated fatty acids (MUFA), *Fucus spiralis* presents an amount of 296 mg/kg dry weight. Oleic acid (C18:1, ω-9Z) is, in general, the most abundant MUFA, but the short chain MUFA C14:1,ω-5Z is also found (Silva *et al.,* 2013). The ω-6/ ω-3 ratio of these algae is 0.84, which means that the amount of ω-3 is higher than the amount of ω-6 (Silva *et al.,* 2013). These fact makes *Fucus spiralis* nutritionally very important, because the ingestion of long chain fatty acids of the ω-3 series, especially ω-3 PUFA, promotes the decrease of cardiovascular and inflammatory diseases (*e.g*. arthritis associated with inflammation) and additionally reduces the risk of cancer (Calder, 2006). In addition, the reduction of dietary ω-6 PUFA and the increase in ω-3 by adults and newborns can contribute