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TITLE: EVALUATION OF IMMUNOMODULATION PROPERTIES OF β -GLUCANS AND PHENOLIC –RICH EXTRACTS RECOVERED FROM BARLEY ON HUMAN ENTEROCYTES

BACKGROUND

(1,3),(1,4)- β -D-glucans are a sort of non-starchy polysaccharides that can be found in several varieties of cereals, such as barley, oat, rye and wheat, in concentrations from 0.5 to 11% in dry basis. These biopolymers present good properties for the human health regarding to the control of cholesterol and glucose concentration in blood when taken, as it is claimed by EFSA (European Food Safety Authority) and FDA (United States Federal Drug Administration).

Currently, several efficient methods based on ultrasounds (UAE) and pressurized hot water (PHW) for the green extraction of high molecular weight β -glucans from waxy barley are being developed [1,2]. However, barley contains a wide range of phenolics, including ferulic and cinnamic acid derivatives, proanthocyanins and lignans with important health-promoting activities which are often simultaneously co-extracted with the β -glucans.

OBJECTIVES

This workplan is part of a major project whose main goal is to design, optimize and develop green separation and fractionation methodologies to obtain high value extracts with health-promoting activities from agro-food by-products.

In particular, the purpose of this work is the evaluation of the antioxidant and anti-inflammatory properties of β -glucans-rich extracts recovered from barley through the different extraction processes, on inflamed-human enterocytes (caco-2 cell model) and investigate the role of the co-extracted polyphenols, on the extracts bioactivity and response.

Task 1: Characterisation of Bioactive-rich fractions

A combination of diverse analytical techniques will be applied in order to determine and quantify different families of bioactive compounds (phenolic acids, flavonoids, procyanidins) in the extracts/fractions obtained.

- Spectrophotometric Methods
- Chromatographic techniques such as thin layer chromatography (TLC);
- HPLC-DAD-MS

The extracts will be also evaluated by their antioxidant activity (chemical assays) through complementary methods: ORAC, HORAC, HOSC.

Task 2: Evaluation of immunomodulatory activity of bioactive-rich fractions using human inflamed-enterocytes

The modulatory effects of bioactive-rich extracts on the oxidative stress biomarkers (i) glutathione homeostasis; ii) proteins carbonyls content; iii) ROS and NO production) and inflammatory mediators (IL-8 and TNF- α secretion) will be studied and compared with the activity of pure compounds (b-glucans, ferulic acid and procyanidin). Differentiated Caco-2 cells will be used as model of human intestinal epithelium.

TIMELINE (use fill tool for the cells)

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10
Task 1										
Task 2										
Task 3										
Task 4										
Task 5										
Task 6										
Thesis										