evaluated peripheral blood mononuclear cells (PBMC) as a model in vitro system as a readily available source of RNA to discern gene expression signatures in relation to personalized obesity treatment. PBMC were collected from obese men before and after an 8-week low-calorie diet (LCD) to lose weight. Changes in gene expression before and after the LCD were validated by qRT-PCR and showed a decrease in some specific oxidative stress and inflammation genes. [Crujeiras, A., Parra, D., Milagro, F., Goyenechea, E., Larrarte, E., Margareto, J., Martínez, A. (2008) Differential Expression of Oxidative Stress and Inflammation Related Genes in Peripheral Blood Mononuclear Cells in Response to a Low-Calorie Diet: A Nutrigenomics Study. OMICS: A Journal of Integrative Biology, 12(4), 1-12]

No regulation of oxidation protective genes has been reported by orally ingested protein hydrolysates and fish protein hydrolysates, in particular. As the major site of first entry for xenobiotics, the oral cavity and the gastrointestinal tract are continuously exposed to a broad array of compounds with ROS capability. Further mucosal metabolism can lead to metabolites with increased toxicity, increasing the susceptibility of the oral cavity and gastrointestinal tract to oxidative metabolites, chemical toxicity, and potential necrotizing colitis. This oxidative damage can also be observed as a secondary effect in nerve tissue as part of the central nervous system.

The up regulation of oxidation protective genes is a viable biological target that would be able to confer a protective effect on the gastrointestinal tract and the central nervous system which can be used in conjunction with medical treatments in the control of Inflammatory Bowel Diseases (IBD) such as ulcerative colitis and Crohn’s disease and CNS degenerative disease such as Parkinson’s, multiple sclerosis and Alzheimer’s diseases.

Accordingly, there still exists a need to develop an ingestible treatment for the oxidative protection of various organs and tissues, when taken orally. The present invention fulfills this need and provides further related advantages.

Summary:

The present disclosure provides a fish protein hydrolysate powder and its constituent peptides for oral use in regulating the function of human oxidation protective genes which provide protection

against oxidative damage in various organs and tissues. The fish protein hydrolysate powder according to the present disclosure compromise one or more peptide compounds with oxidation protective gene regulating activity incorporated into an oral formulation.

The fish protein hydrolysate powder according to the present disclosure possesses improved efficacy for protecting the gastro-intestinal and central nervous system from oxidative damage. Compositions comprising the fish protein hydrolysate powder according to the present disclosure may optionally contain antioxidants or free radical scavengers selected from vitamin E, vitamin A, tree tea oil, green tea extract, butylated hydroxyl anisole (BHA), butylated hydroxyl toluene (BHT) and ferulic acid or derivatives thereof, and the like.

Compositions comprising the fish protein hydrolysate powder according to the present disclosure can further comprise a food grade acceptable ingredient suitable for use in such preparations, such ingredient may include flavorings, emulsifiers, surfactants, emollients, essential oils, gelling agents, humectants, colorants and the like. In one aspect, the present disclosure refers to composition comprising the fish protein hydrolysate powder as disclosed herein, together with at least one pharmacologically acceptable carrier or excipient for use as a medicament.

Furthermore, the composition comprising the fish protein hydrolysate powder according to the present disclosure can be in the form of a powder or solution that facilitates oral delivery for babies, infants, adults and older adults who may have difficulty in swallowing.

The present disclosure also includes a method for treating gastro-intestinal and central nervous system diseases potentially caused by oxidative damage to the organs and tissues concerned. The skin composition according to the present disclosure can be used to protect the gastro-intestinal and central nervous system from oxidative damage, by orally ingesting an effective amount of the fish protein hydrolysate or one or more of its constituent peptides.

In one aspect, the present disclosure refers to an enzymatic hydrolysis process for producing a fish protein hydrolysate powder, comprising the consecutive steps of: i) mixing ground by-products from fish protein material with water and heating; ii) adding endopeptidase enzyme to the mixture of i) and stirring; iii) adding exopeptidase enzyme in the form of carboxypeptidase to the mixture of ii) and stirring; iv) stopping the enzymatic hydrolysis by heat inactivation; v) the fish hydrolysate fraction and the remaining solid material is separated by filtration; and vi) concentrating and drying the fish hydrolysate fraction to yield a fish protein hydrolysate powder.

In one aspect, the present disclosure refers to fish protein hydrolysate powder obtainable by the process as disclosed herein.

Detailed Description Of The Invention:

Before describing the present invention in detail, it is to be understood that the terminology used herein is for the purpose of describing particular embodiments only, and is not intended to be limiting. It must be noted that, as used herein and in the appended claims, the singular forms "a," "an," and "the" include plural referents unless the context clearly indicates otherwise.

Claims

1.

An enzymatic hydrolysis process for producing a fish protein hydrolysate powder, comprising the consecutive steps of:

i) mixing ground by-products from fish protein material with water and heating;

ii) adding endopeptidase enzyme to the mixture of i) and stirring;

iii) adding exopeptidase enzyme in the form of carboxypeptidase to the mixture of ii) and stirring;

iv) stopping the enzymatic hydrolysis by heat inactivation;

v) the fish hydrolysate fraction and the remaining solid material is separated by filtration; and

vi) concentrating and drying the fish hydrolysate fraction to yield a fish protein hydrolysate powder.

2.

Process according to claim 1, wherein said process further comprises a third hydrolysis step of adding protease enzyme derived from aspergillus oryzae to the mixture of iii) and stirring.

3.

Process according to claim 1, wherein the fish protein material originate from fish, preferably a salmonoids, more preferably *salmo salar*.

4.

Process according to claim 1, wherein the endopeptidase is selected from the group consisting of pepsin or trypsin, or any combination thereof.

5.

Fish protein hydrolysate powder obtainable by the process according to any of claims 1 - 4.

6.

Composition comprising the fish protein hydrolysate powder according to claim 5, together with at least one pharmacologically acceptable carrier or excipient for use as a medicament.