Methods for characterization of short peptides in hemp seed flour

KEYWORDS

- ❑ HEMP SEED
- ❑ SHORT PEPTIDES
- ❑ ULTRAFILTRATION
- ❑ MULTIFUNCTIONAL ACTIVITY
- ❑ METABOLIC SYNDROME

AREA

- ❑ PHARMACEUTICAL

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Priority Number
n. 102022000003347_23.02.2022

Patent Type
Patent for invention

Co-Ownership
Università degli Studi di Roma La Sapienza 70%, Università degli Studi di Milano La Statale 30%

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Industrial & Commercial Reference
Pharmaceutical (drugs for metabolic syndrome), Nutraceutical (dietary supplements for metabolic syndrome)

Time to Market
TRL4 Component and/or Breadboard Laboratory Validated.

Availability
Cession, Research, Develop-ment, Experimentation, Start-up and Spin-off.

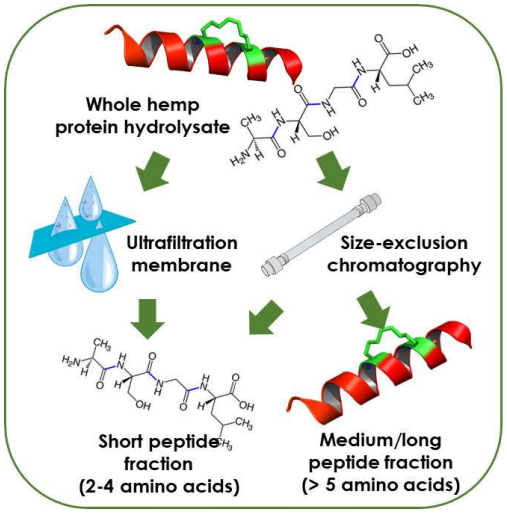

Fig. 1 Protocol of purification of medium-sized and short-sized peptides.

Abstract
The present invention provides a method for the obtention of a mixture of short peptides (i.e., peptides with 2-4 amino acid long sequences) from hemp seed proteins. Among natural products, short peptides are particularly interesting and show advantages over longer peptide sequences; in particular, short peptides have low cytotoxicity and the ability to maintain their biological properties unaltered upon absorption, as they are not subject to in-vivo transformation.
An analytical platform based on high-throughput techniques was developed to purify and identify short peptide sequences; then, biological activity associated with the prepared hydrolysates was tested for metabolic syndrome management.

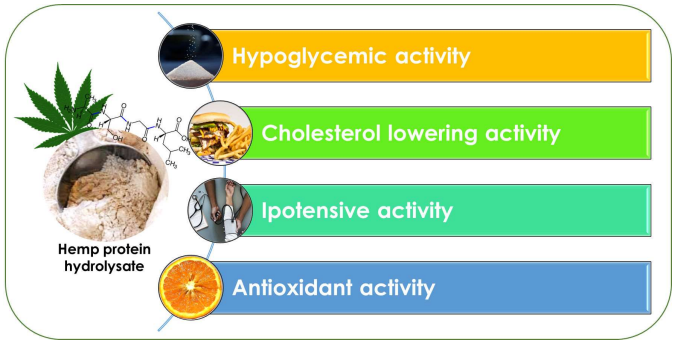

Fig. 2 Biological activities of hemp protein hydrolysate.

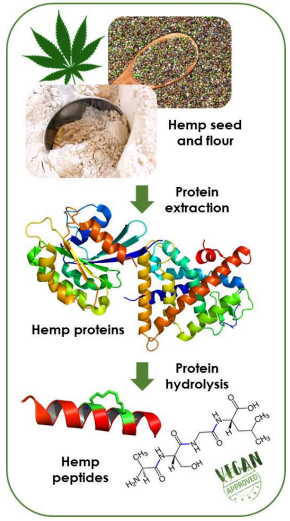

Fig. 3 Protocol of extraction and hydrolysis of peptides from hemp seed or flour.

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Technical Description

The invention patent allows you to obtain short peptides from hemp seed proteins with the following step: 1) extraction of proteins 2) enzymatic digestion of proteins 3) peptides purification by ultrafiltration or size exclusion chromatography 4) identification of short and medium sized peptides 5) biological activities assays of the prepared peptide mixtures. In particular, the potential hypotensive, hypoglycemic, cholesterol-lowering, and antioxidant activities was tested. The described process is easy to scale-up amd the solvents used can be recovered, making the invention green. With this invention is possible to obtain a mixture of short peptides separated by medium-sized peptides.

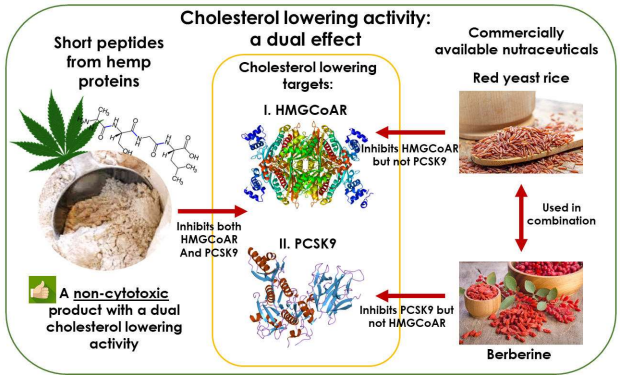

Fig.4 The dual cholesterol lowering activity of hemp protein hydrolysate.

Technologies & Advantages

The isolated mixture offer the opportunity to prepare patented proprietary combinations of chemically well-defined nutraceuticals to improve specific health issues as support to conventional drug treatments. Preventive and therapeutic methods, based on the use of natural bioactive compounds, are free from significant side effects and could represent a proper adjuvant treatment to reduce hospitalization and health costs and improve the quality of life of patients with metabolic syndrome. In this context, red yeast rice (RYR) extract administration represents an effective strategy for promoting vascular and metabolic wellness. Due to the presence of monacolin K (the same compound sold with the commercial name of lovastatin), RYR possesses specific adverse effects that are typical of statins. The obtention of short-chain bioactive peptides (BPs) with multifunctional properties, i.e., hypoglycemic, hypotensive, cholesterol-lowering, and antioxidant activities, from hemp seed flour is a promising alternative for metabolic syndrome management.

Applications

Short peptides are used in various industrial sectors, such as pharmaceutical, nutraceuticals and cosmetics. In the field of pharmaceuticals and nutraceuticals, short peptides can reduce total cholesterol levels, diabetes and blood-pressure. Moreover, they can represent a valid alternative to red yeast rice which represents an effective strategy for promoting vascular and metabolic wellness but possess specific adverse effects that are typical of statins.

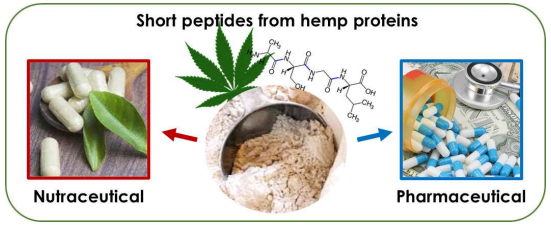

Fig.5 Application field of obtained product.

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