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Screening and Purification of Metal Chelating Peptides in Hydrolysates for their Antioxidant Properties

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Introduction

Metal-chelating peptides obtained after protein hydrolysis
- Antioxidant properties related to the inhibition of Fenton reaction, responsible of ROS production
- Used in pharmaceutics, foods and cosmetic

Novel strategy for the screening and purification of the peptides to target their antioxidant properties. Novel approach developed in order to save time.

Currently developed methods for the screening and separation of metal-chelating peptides

An interdisciplinairy approach

Screening of metal-chelating peptides
by Surface Plasmon Resonance (SPR)

Processes and Modelling
Integration of these SPR data for separation prediction in Immobilized Metal Ion Affinity Chromatography (IMAC)

Bioactivity tests
Determination of metal chelation capacity using UV-visible spectrophotometry

Pharmacology study of metal chelating peptides in cellulo: determination of their intestinal permeability

Nanoparticles for bioimaging

Some results

Conclusion and Perspectives

SPR using a M²⁺-chip:
- a miniaturized approach of IMAC-type affinity chromatography
- screening of the most interesting sources of metal-chelating peptides.

Positive correlations evidenced between SPR screening and metal chelation tests using UV-Vis spectrometry on five sources of peptides.

The affinity parameters are determined by SPR on some synthetic model peptides and then used to predict the separation of peptides on IMAC chromatographic column.

Novel chromatography-MS method currently developed:
- Screening of metal-chelating peptides sequences in a given complex mixture
- Methodology successfully set-up on a mixture of synthetic peptides
- Further tests on real hydrolysates

Identified peptides currently assessed for their antioxidant activity by chemical metal chelation and by in cellulo tests.

Potential health application
- Treatment of ferriprive anemia related to MICI, or inversely to hemachromatosis
- Anchoring of these chelating peptides on nanoparticles for bioimaging or therapeutic applications.