

Extended Abstract

# Chemical and Biological Characterization of Protein Hydrolysates from Freshwater Fish Waste <sup>†</sup>

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## 1. Introduction

Freshwater fish skin and bones are usually by-products of the fish processing industry. These are good sources for obtaining bioactive peptides with high additional value. The aim of this work was to obtain protein hydrolysates by different enzymatic hydrolysis from fish waste (bone, skin and meat) and to assess their chemical and biological properties.

## 2. Materials and Methods

Protein hydrolysates were obtained by enzymatic methods with papain, flavourzyme, alkalase and a mixture of flavourzyme and alkalase from freshwater fish waste (bones, meat, skin). Protein content was determined by the biuret method, peptide molecular weight was assessed by SDS-PAGE in 10–20% tris-tricin gel [1], antioxidant capacity was assessed by the DPPH method [2] and antihypertensive activity by determining angiotensin-converting enzyme (ACE) inhibition [3]. Sample cytotoxicity testing was performed on fibroblast cells (NCTC line) after 48 h of culture.

## 3. Results

The extraction yield values of the four protein hydrolysates varied between 20% and 53%, depending on the type of enzyme used. The protein content was over 50% in all peptide extracts except the sample extracted with flavourzyme, which was 32%; the percentage of protein content was over 90% in papain and alkalase variants of hydrolysis. The molecular weight of protein hydrolysates ranged from 3 to 30 kDa, except the sample obtained by flavourzyme hydrolysis, which contained peptides higher than 30 kDa. The inhibition potential of DPPH free radicals ranged between 49% and 56%, while the degree of ACE inhibition ranged between 22% and 27%. The scavenging effect of fish waste hydrolysates on DPPH free radicals was highest in the case of the protein extract isolated with flavourzyme. The protein hydrolysate obtained with alkalase treatment presented the highest antihypertensive activity. The results of in vitro testing on fibroblasts show that all variants of protein hydrolysates are biocompatible up to a concentration of 6000 g/mL. Extracts obtained by treatment with papain and a mixture of flavourzyme and alkalase were non-cytotoxic at 8000 g/mL. The

morphology and phenotype of the cultured fibroblasts in the presence of the four peptide extracts remained normal during the tests, proving the biocompatibility of the protein hydrolysates.

#### 4. Conclusions

Our results demonstrate that protein hydrolysates obtained by enzymatic hydrolysis from freshwater fish waste had high peptide content, with a DPPH radical scavenging effect, antihypertensive activity and good biocompatibility.

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