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Current Insights into Bioactive Peptides in Fish: Potential Applications and Health Benefits

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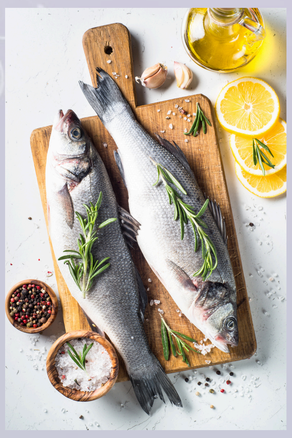
Introduction

Bioactive peptides derived from fish have attracted significant attention in recent years due to their remarkable health benefits and versatile applications. These peptides, produced primarily through enzymatic hydrolysis of fish muscle and by-products, exhibit potent antioxidant, antimicrobial, and antihypertensive properties. As a sustainable and natural resource, fish-derived peptides offer promising solutions for developing functional foods and innovative therapeutics.



Summary

1. **General Fish-Derived Peptides:** Extracted through enzymatic hydrolysis, these peptides demonstrate antioxidative and antimicrobial properties, contributing to natural food preservation and functional food innovation.
2. **F21 Peptide (*Gadidae* Fish):** Exhibits strong antioxidant activity and ACE inhibitory properties, making it valuable for cardiovascular health and food preservation.
3. **Ser-Pro (SP) Peptide (Skipjack-Tuna)**: An ACE inhibitor that effectively regulates blood pressure, showcasing potential therapeutic applications for cardiovascular diseases.

F21 Peptide [1]

```
          10        20
          |         |
FKYDSTHGRFHGEVKAEGGKL
ccccccccccceeeeeeceec
```

Prediction of the secondary structure of F21 (Legend: c - coil structure; e - extended strand or part of a beta-sheet structure)

- **Activity:** Antioxidant with an IC50 value of 389.9 µg/mL (DPPH assay).
- **Additional Properties:** Strong angiotensin-converting enzyme (ACE) inhibitory effects.
- **Importance:** antioxidant and antihypertensive

Source and extraction:

The *Gadidae* are a family of marine fish, included in the order Gadiformes, known as the cods, codfishes, or true cods.

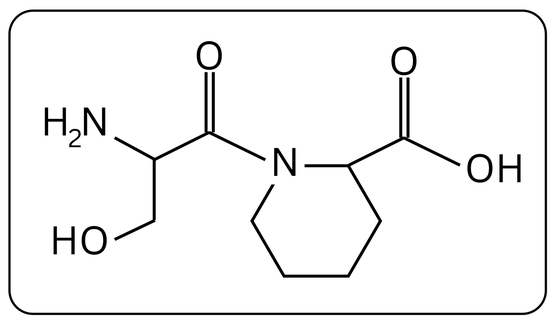
Protein Extraction and enzymatic hydrolysis

Acidic extraction using HCl at pH3 and pepsin enzyme. 8 hours of digestion at 37ºC

Purification of Protein Hydrolysates

Concentrated and sterilized followed by fractionation and analysis of the fractions using a Reverse Phase HPLC.

Ser-Pro (SP) Peptide [2]



TMAP1: Ser-Pro (SP). The isolated peptide that shows the most ACE-inhibitory activity.

- **Activity:** ACE inhibitory peptide with 72.71 ± 1.36% of inhibition.
- **Additional Properties:** Regulates blood pressure, showcasing significant potential in cardiovascular health management.
- **Importance:** Highlights the therapeutic application of fish-derived peptides.

Source and extraction:

Skipjack Tuna (*Katsuwonus pelamis*)

Enzymatic hydrolysis

Using the enzyme Alcalase pH 9.4 at 56ºC

Protein Purification

Ultrafiltration to separate peptides. Reverse Phase HPLC for specific peptide isolation

Conclusion

Bioactive Potential

Fish-derived peptides show high ACE inhibitory activity and AOx activity, supporting hypertension management and cardiovascular health.

Effective Processes

Techniques such as ultrafiltration and chromatography ensure efficient extraction and purification of bioactive peptides.

Future Perspectives

Continued research is needed to optimize production, enhance bioactivity, and expand applications in functional foods and pharmaceuticals.

References

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