Peptide from tempeh-like fermented Chenopodium formosanum counters UVA-induced skin photoaging

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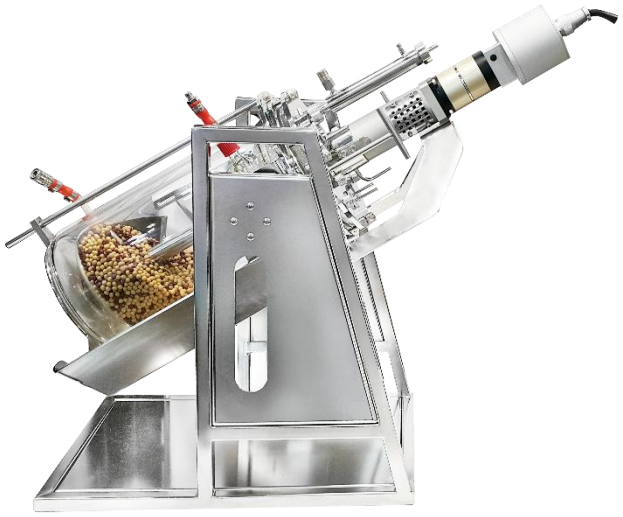
Abstract

This study aimed to develop a peptide-based anti-photoaging ingredient from tempeh-like fermented *Chenopodium formosanum*(djulis). Solid-state fermentation using *Rhizopus oligosporus* was carried out to enhance peptide production. After ultrafiltration and LC-MS/MS analysis, peptide NIGK (Asn-Ile-Gly-Lys) was identified. NIGK significantly improved HaCaT cell viability under UVA stress, reduced intracellular ROS, and restored ECM integrity by suppressing MMP-1 expression and upregulating collagen I. The results suggest that NIGK from fermented djulis has potential as a natural cosmeceutical against UVA-induced skin aging..



Winpact Model: FS-V-SA05P

Introduction

Skin photoaging is mainly caused by UVA exposure, which induces oxidative stress and matrix degradation via ROS generation and MMP upregulation. Natural bioactive peptides with antioxidant and anti-photoaging properties are gaining attention. *Chenopodium formosanum* is a rich source of high-quality protein and antioxidants, and its fermentation may enhance peptide bioavailability. This study investigates peptides derived from tempeh-like fermented djulis for cosmeceutical potential.

Materials and Methods

Chenopodium formosanum seeds were washed, soaked, autoclaved, and inoculated with *Rhizopus oligosporus* spores at 10^6 spores/g. Solid-state fermentation was conducted at 30 °C for 48 hours in sterile trays. The fermented product was lyophilized and subjected to protein extraction and ultrafiltration for peptide isolation.

Results

- The peptide NIGK was isolated from fermented djulis via LC-MS/MS.
- NIGK significantly enhanced HaCaT cell viability under UVA stress.
- It reduced ROS accumulation and downregulated MMP-1 expression.
- NIGK also upregulated collagen I expression, restoring ECM integrity.

References

Peptide from tempeh-like fermented *Chenopodium formosanum* counters senescence while enhancing antioxidant ability in non-replicative aging

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