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Antioxidant and cryoprotective effects of a tetrapeptide isolated from Amur sturgeon skin gelatin



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ABSTRACT

The peptide Pro-Ala-Gly-Tyr (PAGT) was isolated from Amur sturgeon skin gelatin and its antioxidant activity and cryoprotective effect in Japanese sea bass (*Lateolabrax japonicus*) mince was investigated. PAGT showed scavenging activity against DPPH, ABTS and hydroxyl radicals with no metal chelating activity. At a level of 25 ppm, PAGT prevented lipid oxidation in minced fish, but at higher levels it was ineffective. Low-field nuclear magnetic resonance (LF ¹H NMR) detected three water pools in mince in the range of 1–10, 10–100 and 100–300 microsecond (ms), respectively. PAGT influenced water distribution in the mince. Mince with PAGT (25 ppm) had the highest T₂₁ population, corresponding to a lower amount of water in T₂₂ population after 6 freeze/thaw cycles (P < 0.05). Myosin and actin denaturation decreased in the presence of PAGT. Lipid oxidation in mince was impeded when PAGT was incorporated at 25 ppm as evidenced by the lower hydroperoxides from Fourier transform infrared (FTIR) spectra.

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1. Introduction

The formation of reactive oxygen species (ROS) including hydroxyl radical ([•]OH), superoxide radical (O₂^{•-}), hydrogen peroxide (H₂O₂), hydroperoxyl radical (HO₂[•]), lipid peroxyl radical (LOO[•]), alkoxyl radical (LO[•]), and singlet oxygen (¹O₂) have been implicated in the oxidative deterioration of food

products as well as in the pathogenesis of several human diseases such as atherosclerosis, diabetes mellitus, chronic inflammation, neurodegenerative disorders and certain types of cancer. Especially [•]OH is the most reactive oxygen radical which reacts at or close to its site of formation with every molecule in living cells, such as DNA, protein, phospholipid, amino acid, sugar as soon as it is produced (Min & Ahn,

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