When chicken skin meets sugars: a new generation of antioxidants?

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Summary

- This research is part of the project: Innovative functional ingredients from underutilized poultry proteins: salty and "kokumi" peptides;
- The research was designed to investigate the possibility of producing antioxidant peptides/glycopeptides from chicken gelatin.

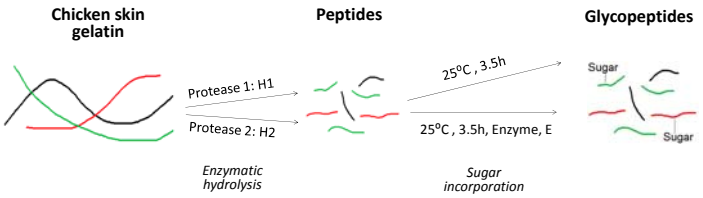
Background

- The antioxidant property of peptides from various proteins has been deeply investigated;
- A peptide's antioxidant activity depends on the type of: native protein and protease used for hydrolysis, degree of hydrolysis, peptide's hydrophobicity and molecular weight;
- Chicken gelatin can be produced from different parts of the bird including skin;
- Gelatin hydrolysates from different proteins have shown antioxidant activity;
- Sugars can be incorporated into peptides by non enzymatic (glycation) or enzymatic (glycosylation) reaction.

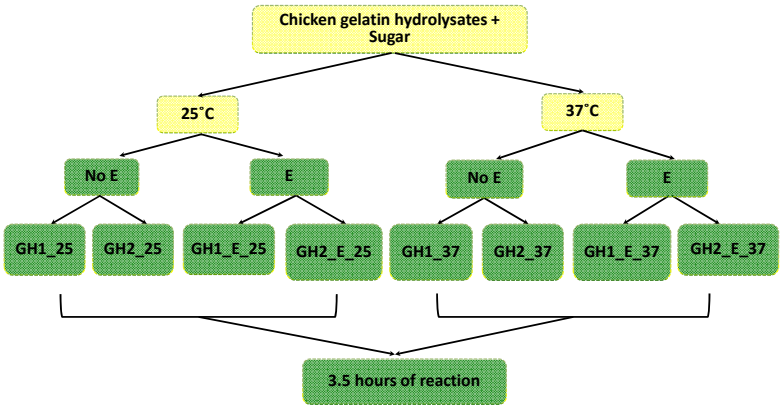
Objective

Can glycation or glycosylation of peptides increase their antioxidant activity?

Our approach



- Chicken skin gelatin was hydrolyzed by protease 1 and protease 2;
- The hydrolysates were mixed with a sugar in presence or absence of a specific enzyme;
- Obtained aliquots were incubated for 3.5 hours at 25˚C or 37˚C;
- The enzymes and unreacted sugar were removed by ultrafiltration and dialysis;
- Glycoconjugates & control (non-treated hydrolysate) were tested for their capacity to inhibit linoleic acid peroxidation.



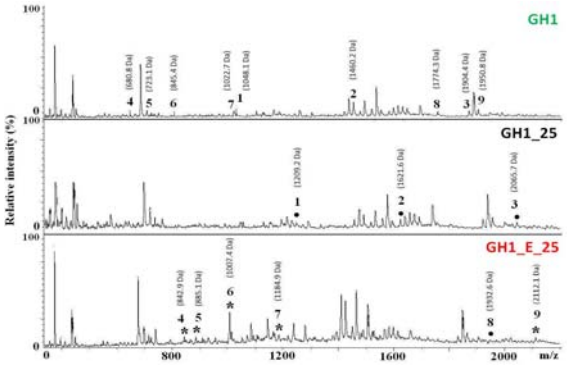


Fig. 1. MALDI-TOF-Mass spectra of chicken gelatin hydrolyzed by protease 1 (GH1), chicken gelatin hydrolysate glycated at 25˚C (GH1_25) and chicken gelatin hydrolysate enzymatically glycosylated at 25˚C (GH1_E_25). Glycosylated peptides are marked with an asterisk (*) while glycated peptides are marked with a filled circle (•)

- 6 and 3 glycopeptides are produced in presence or absence of the enzyme, respectively

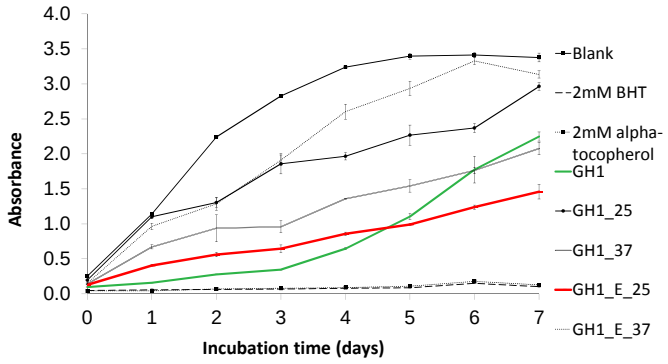


Fig. 2. Inhibition of linoleic acid peroxidation by chicken gelatin hydrolysate & hydrolysate glycoconjugates.

- Hydrolysate glycosylated at 25˚C is the best lipid peroxidation inhibitor overtime

Our Observations

- Enzymatic glycosylation allows a relatively fast incorporation of sugar into peptides at ambient temperature;
- The incorporation of sugar at 25˚C increases the antioxidant activity of chicken gelatin peptides.

What Does this mean?

- The new generation of glycopeptides show the potential to be used as stabilizer in lipidic food systems (eg. sausages).

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