



Glycation leads to polymerization and tryptic resistance of beta-lactoglobulin

François Chevalier, Jean-Marc Chobert, Thomas Haertle

► To cite this version:

François Chevalier, Jean-Marc Chobert, Thomas Haertle. Glycation leads to polymerization and tryptic resistance of beta-lactoglobulin. Milk protein conference, Mar 2000, Vinstra, Norway. hal-04239052

HAL Id: hal-04239052

<https://hal.science/hal-04239052>

Submitted on 18 Oct 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

GLYCATION LEADS TO POLYMERIZATION AND TRYPTIC RESISTANCE OF β -LACTOGLOBULIN

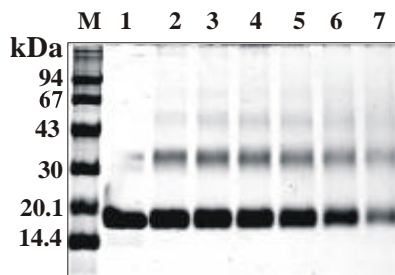


Jean-Marc CHOBERT, François CHEVALIER and Thomas HAERTLE

Institut National de la Recherche Agronomique. Laboratoire d'Etude des Interactions des Molécules Alimentaires.
B.P. 71627, 44316 Nantes Cedex 3, France.

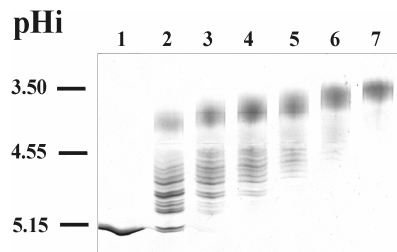
The Maillard reaction also named “non-enzymatic browning” is a chemical reaction involving reducing sugars and the amino groups of amino acids and proteins. Despite its great importance in culinary art thanks to generation of flavors this reaction may be also deleterious because of uncontrolled deterioration of foods during storage and processing. The aim of this work was to determine how the time of heating of β -lactoglobulin, at 60°C, in the presence of glucose, could influence the modification of this most important whey protein.

SDS-PAGE

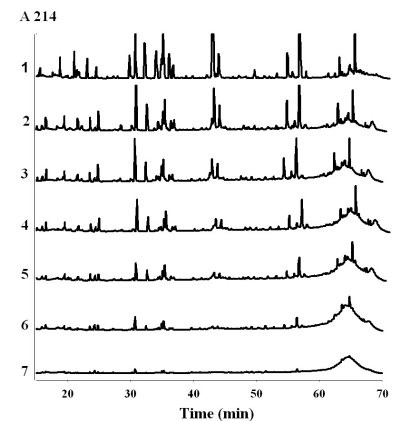


1 : BLG native ; 2 to 7 : BLG heated at 60°C with glucose during 24, 48, 72, 96, 168 and 264 h, respectively.

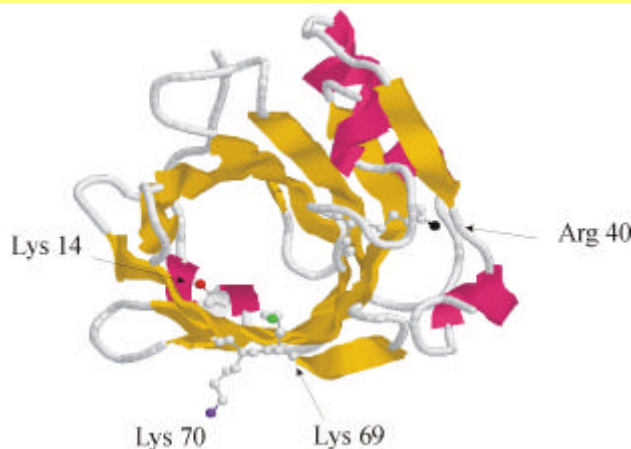
IEF



RP-HPLC



Upon heating, glycation induced the polymerization of β -lactoglobulin via non S-S bond; molecular masses of about 18, 36 and 55 kDa could be observed in SDS-PAGE. The grafting of glucose on lysine and arginine (the most modified amino acids on the protein) led to a shift of the pHi of the modified proteins toward acidic pH (IEF) and to a resistance to tryptic attack (RP-HPLC).



The tryptic peptide maps (see above) show that Lys 14 and Arg 40 are not glycosylated preferentially. A comparison between Lys 69 and 70 indicates slower glycation of Lys 69 what agrees with its spatial orientation and its potential biological role.

The Maillard reaction between β -lactoglobulin and glucose makes modified proteins resistant to trypsinolysis. Consequently, glycation may affect the nutritional properties of this whey protein. However, since the amino acids involved in ligand binding are not glycosylated, this implies their shielding by spatial factors and/or possible internalized ligands.