



HAL
open science

Interactions between casein micelles cross-linked with transglutaminase and cyanidine3-O-glucoside

Federico Casanova, Thomas Croguennec, Said Bouhallab, Frederic Gaucheron, Guilherme Miranda-Tavares, Naaman Francisco Nogueira Silva, N.H. Nogueira, Antonio de Carvalho Fernandes

► To cite this version:

Federico Casanova, Thomas Croguennec, Said Bouhallab, Frederic Gaucheron, Guilherme Miranda-Tavares, et al.. Interactions between casein micelles cross-linked with transglutaminase and cyanidine3-O-glucoside. 1st Food Chemistry conference, Oct 2016, Amsterdam, Netherlands. 2016. <hal-01512054>

HAL Id: hal-01512054

<https://hal.science/hal-01512054v1>

Submitted on 5 Jun 2020

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.



HAL Authorization

**Interactions between casein micelles cross-linked with transglutaminase
and cyanidine3-O-glucoside**

F. Casanova^{1,2}, T. Croguennec², S. Bouhallab^{*2}, F. Gaucheron², G. Tavares², M. H. Nogueira², N. F. Nogueira Silva³, A. F. de Carvalho²

¹UFV, Brazil, ²INRA - Agrocampus Ouest, France, ³UFSCar, Brazil

Casein micelles (CMs) are natural supramolecular aggregates present in milk. Their structure is highly sensitive to acidification. In contrast, CMs reticulated with transglutaminase (CMs-Tg) are much more stable than CMs at acidic pH. Cyanidin-3-O-glucoside (C3G) is a water-soluble molecule of flavonoids subgroup. It shows several beneficial effects: free radical scavenging activity and prevention of cardiovascular disease. However, the low pH stability of C3G limits its applications as bioactive molecules. Its stability can be improved by binding C3G to others molecules.

In this way, the objective of the present work is to investigate the interaction between CMs-Tg and C3G under acidic (pH 2.0) and neutral (pH 7.0) conditions. CMs were reticulated with Tg and then aliquoted at pH 7.0 and 2.0. ζ (Z-potential) and size of the particles of CMs-Tg were determined by dynamic light scattering (DLS). Fluorescence quenching spectroscopy was used to determine the binding interaction between CMs-Tg and C3G. Results obtained by DLS show that the average diameter of CMs-Tg was 160 ± 7 nm at pH 7.0 (similar to CMs control sample), whereas it was of 145 ± 1 nm at pH 2.0. ζ (Z-potential) of CMs-Tg was slightly more negative than of CMs (-22 mV versus -19 mV) due to the reduction of the number of positive charges on CMs consecutive to the reaction of reticulation. No difference of size and ζ was observed in the presence of C3G. Results obtained by fluorescence spectroscopy suggested that C3G quenched CMs-Tg fluorescence in a static mode with a strong binding constant of 106 M^{-1} at pH 7.0 and 2.0. The reticulation doesn't affect the binding properties of CMs for C3G at pH 7.0. The various natures of interactions, obtained by thermodynamic analysis, are also considered and discussed within the present work.

Keywords: Interaction, Casein Micelles, Transglutaminase, Cyanidin-3-O-glucoside