PO82 - 24967 - β-LG NANO DELIVERY SYSTEMS: SUSTAINED RELEASE OF RIBOFLAVIN INTO FOOD SIMULANTS UNDER VARIOUS TEMPERATURES

***Lívia Simões*[1]; *António Vicente*[1]; *Oscar Ramos*[2]**

1 - CEB – Centre of Biological Engineering, University of Minho; 2 - CBQF – Centro de Biotecnologia e Química Fina, Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Porto

E-mail: liviasimoes@ceb.uminho.pt

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Abstract

β-Lactoglobulin (β-Lg), the main protein fraction of whey proteins, can be used to encapsulate bioactive compounds due to its gelation capacity, which allows forming nanostructures, and their affinity to bind to a wide range of molecules. Riboflavin is an essential vitamin for human growth and wellbeing, having thus been studied as hydrophilic model compound. Its use in food products is still limited by several issues including photodegradation and low solubility in water. Riboflavin encapsulation may overcome these issues and possibly display a controlled release behavior. Food-grade β-Lg nanostructures (β-LgN) were developed at pH 6, at 80 °C for 15 min to encapsulate 0.105 mg mL^{-1} of riboflavin. Release kinetics of riboflavin from β-LgN were assessed in hydrophilic (ethanol 10%) and hydrophobic (ethanol 50%) food stimulants (Commission Regulation EU No10/2011) at 4 and 25 °C. Kinetic models considering both Fickian and Case II transport (Linear Superposition Model - LSM) were fitted to release kinetics data. The impact of release conditions on particle size and surface charge of nanostructures was performed by dynamic light scattering (DLS). The LSM model was the most suitable to describe the release kinetics, which is mainly governed by a relaxation mechanism. These results were in agreement with DLS observations, which showed a decrease on surface charge and an increase on particle size. β-LgN were relaxed and weaker as a consequence of the riboflavin release until the equilibrium state was reached. It was observed that the contribution of relaxation to the release mechanisms increases with temperature. Riboflavin release kinetics on the hydrophobic food simulant provided a higher riboflavin retention when compared with the hydrophilic food simulant, independently of temperature. These observations indicate that food-grade β-LgN may represent suitable means for controlled delivery of hydrophilic compounds in food applications, however, further information is needed to clarify the mechanisms which are involved in it.

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