Scientists use pulsed light to modify the protein that causes milk allergy

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The spanish scientists from the University of Granada

Spanish scientists from the U. of Granada and the Azti-Tecnalia technology centre have designed a type of lactose protein which is easier to digest by humans, and which could lower the allergenicity of milk. They have done this without at all altering its functional properties.

The researchers have managed to modify a type of lactose protein called

β-lactoglobulin artificially by means of a treatment with pulsed light. This protein, which is present in lactose serum, is responsible for approximately 10% of milk-related allergies. As a result of this treatment, milk becomes much more digestible.

Julia Maldonado-Valderrama, a researcher at the University of Granada involved in this project, explains that β-lactoglobulin is difficult to digest because this protein has a compact and complex structure that resists enzymatic processing during digestion. "This complexity is nevertheless necessary for proteins to fulfil their structural function as stabilizing agents of emulsions or foams."

One way to facilitate the digestion of proteins could be to break up or dismantle their structure. However, if the structure of the protein is severely degraded it loses is functional properties.

Modify the proteins

"In this project, which has been published in the journal *Soft Matter*, we have used a type of lactose protein modified by means of a treatment with pulsed light, a method of bacterial inactivation which is widely used in the food industry, but never before used to modify proteins". This process, patented by the team at the Azti-Tecnalia technology centre, degrades the structure of the protein by increasing the amount of light pulses.

With this method, scientists confirmed that, first, the functional properties of the protein are not affected by the pulsed light treatment. "We actually demonstrated that in some cases pulsed light even improves the emulsive properties of lactose protein", Maldonado-Valderrama points out. "We then studied the effects of this pulsed light modified protein upon digestion".

In order to do so the researchers employed a device designed and built at the University of Granada, called Octopus, which simulates the digestive process of a protein in a single drop of emulsion. Thus, the simulation of the digestive process demonstrated that the pulsed light treatment facilitates digestion of this protein, in particular in the small intestine.

"Finding a way of improving the digestibility of proteins without altering their functional properties is a current challenge within food technology and, in this respect, the pulsed light treatment is a very promising tool when it comes to the design of low-allergy food products", the University of Granada researcher concludes.

More information: "Improved digestibility of β-lactoglobulin by pulsed light processing: dilatational and shear study." *Soft Matter*, 2014 DOI: 10.1039/C4SM01667J

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