

Unravelling the behavior of nanostructures during digestion and absorption

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The food industry is increasingly focused on preventing nutrition-related diseases and improving consumers' wellbeing. As a result, there is a growing trend towards healthy foods, enriched with bioactive compounds (such as vitamins, probiotics, bioactive peptides and antioxidants) produced through the application of innovative and safe technologies. In this context, the development of novel delivery systems for food applications through the use of nanotechnology has been extensively explored [1]. In fact, the encapsulation of bioactive compounds in bio-based nanostructures have been reported as promising mean of protecting the valuable bioactive compounds and providing new functionalities (e.g. increase of bioavailability). However, the use of very small particle sizes may alter the biological fate of the ingested materials and bioactive compounds, which could potentially have adverse effects on human health [2].

Therefore, the emerging field of nanotechnology offers new challenges to food industry not only by offering novel tools to improve food quality and human health, but also by introducing questions about nanostructures' behaviour within the human body. The challenges that must be overcome before nanotechnology can be entirely embraced by food industry, includes the optimisation of nanostructures' formulations to increase stability and bioactive compounds' bioavailability and the risk assessment of their use in food. The understanding of the behaviour of different nano-based delivery systems (e.g. nanoemulsions, nanoparticles) under digestion conditions, assessing their efficiency and safety is therefore of utmost importance to enable its widespread application in the food industry.

This evaluation can be challenging, however, there are opportunities to take advantage from the lessons learned from pharmaceutical industry and of the considerable progress in the development of more realistic *in vitro* models to more accurately predict the behaviour of bio-based nanostructures once ingested.

References

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