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NanoLectures Series 2017

Food-grade nanoparticles: Properties, applications, gastrointestinal fate, and potential toxicity

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Time: 12:30-1:30 pm
Place: 665 Huntington Ave,
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Abstract: Edible nanoparticles are increasingly being utilized by the food industry to enhance the nutritional attributes, safety, shelf life, appearance, and texture of foods. A wide range of inorganic (*e.g.,* titanium dioxide, silicon dioxide, zinc oxide, and silver) and organic (*e.g.,* lipid, protein, and carbohydrate) nanoparticles is being used in these applications, which vary in their composition, physical state, shape, dimensions, aggregation state, and surface charge. There is concern from consumers, industry, and regulators about the potential risks associated with ingesting these food-grade nanoparticles. Consequently, a great deal of research is focused on understanding the gastrointestinal fate of different kinds of food nanoparticles, as well as their potential for causing chronic or acute toxicity. In this presentation, current knowledge about the potential gastrointestinal fate and toxicity of both organic and inorganic food nanoparticles is reviewed, with special emphasis on the lipid nanoparticles found in food-grade nanoemulsions. In particular, the importance of taking into account the nature of the food matrix and gastrointestinal conditions on the properties of food nanoparticles is highlighted. In the case of nanoemulsions, there are a number of potential risks associated with reducing the size of the lipid droplets that should be considered: alterations in the fate of bioactive agents within the gastrointestinal tract; enhancement of the bioavailability of undesirable hydrophobic substances in foods (such as pesticides and hormones); potential toxicity of some of the ingredients used in their fabrication (such as synthetic surfactants).

Biographical Sketch: David Julian McClements is a Distinguished Professor at the Department of Food Science at the University of Massachusetts. McClements received his Ph.D. in Food Science (1989) at the University of Leeds (United Kingdom) in ultrasonic spectrometry. He then did Post-Doctoral Research at the University of Leeds, University of California (Davis) and University College Cork (Ireland). In addition, he has published over 750 scientific articles in peer-reviewed, 12 patents, as well as numerous book chapters. Prof. McClements has previously received awards from the *American Chemical Society, American Oil Chemists Society, Society of Chemical Industry (UK), Institute of Food Technologists,* and *University of Massachusetts* in recognition of his scientific achievements.

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