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Applications of nanotechnology in nutrition

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Healthy diet is literally indispensable to sustain a healthy life. However, it is always an issue to reach reliable and sustainable food sources and to keep the food fresh longer and get the maximum benefits from them due to the problems of modern world with increasing human population, industries and technology. Thus, there is an urgent need for innovative solutions to supply the food of high quality. In this sense, use of nanotechnology is very important and it is considered as an enabling technology to contribute food technology. Currently, nanotechnology has evolved more to the food industry in the areas of food production, processing, conservation, packaging, safety, sensing, nutraceuticals delivery and functional food etc. There are variety of nanosystems including quantum dots, nanoparticles, nanofibres, nanocapsules or nanoemulsions which are designed to take the role for developing better methods to enhance the food quality and quantity. Graphene derivatives are class of one of these nanosystems which have been recently under investigation to serve in nutrition industry. Recent studies have proved that it is possible to get incremental benefits from use of such nanosystems in food industry, in a very large span from therapy to agricultural production. However, it is always an issue of debate to cope with the possible disadvantages of such systems since technology brings the problems along with its solutions. Thus, to minimize these problems is another issue. My talk will focus on the use of nanotechnology in the area of nutrition and will shortly debate its advantages, possible unfavorable outcomes and solutions.

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Targeting mitochondria for preventing and treating diabetes with natural compounds from food and nutrition

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Insulin resistance is an important feature of type-2 diabetes and obesity. The underlying mechanisms of insulin resistance are still unclear. Mitochondrial dysfunction, including mitochondrial loss and over-production of oxidants has been suggested to be involved in insulin resistance. Increasing evidence suggests that targeting mitochondria to protect mitochondria function could prevent and ameliorate various diseases associated with mitochondrial dysfunction to form a unique medicine, i.e., mitochondrial medicine. In this presentation, I will summarize our recent studies with nutrients to target mitochondria by stimulating mitochondrial homeostasis to improve mitochondrial function and regulate redox balance for preventing and ameliorating diabetes. We have focused on natural compounds from food and nutrition including olive, bitter melon and pomegranate to regulate mitochondrial biogenesis and degradation in cellular systems and in animal models. The in vitro and in vivo studies on the effects and mechanisms of mitochondrial targeting nutrients or their combinations may help us to understand the importance and mechanisms of mitochondrial metabolism and to develop mitochondria-targeting agents for preventing and treating diabetes.

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