

National Institute of Health detect nanotechnology in Coca-Cola and Pepsi products.

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Fluorescent Nanoparticles Present in Coca-Cola and Pepsi-Cola: Physicochemical Properties, Cytotoxicity, Biodistribution and Digestion Studies

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Abstract

Foodborne nanoparticles (NPs) have drawn great attention due to human health concerns. This study reports the detection of the presence of fluorescent NPs, about 5 nm, in two of the most popular beverages, Coca-Cola (Coke) and Pepsi-Cola (Pepsi). The NPs contain H, C and O, three elements with a tunable emission and with a quantum yield of 3.3 and 4.3% for Coke and Pepsi, respectively. The presence of sp³-hybridized carbon atoms of alcohols and ethers bonds was confirmed by NMR analysis. The NPs can be taken up by living cells and accumulate within cell membrane and cytoplasm. Evaluation of the acute toxicity of the NPs revealed that the BALB/c mice appeared healthy after administration of a single dose of 2 g kg⁻¹ body weight. Analysis of glutamate pyruvate transaminase (GPT), glutamic oxaloacetic transaminase (GOT), urea and creatinine showed that there were statistically, but not biologically, significant differences in some of these biochemical parameters between the test and control groups. No obvious organ damage or apparent histopathological abnormality was observed in the tested mice. The biodistribution study in major organs indicated that the NPs were easily accumulated in the digestive tract, and they were able to cross the blood-brain barrier and dispersed in the brain. In vitro digestion of the NPs showed a significant fluorescence quenching of the NPs. This work represents the first report of foodborne fluorescent NPs present in Coke and Pepsi, and provides valuable insights into physicochemical properties of these NPs and their toxicity characteristics both in vitro and in vivo.

Keywords: Coca-Cola: Foodborne nanoparticles: Pepsi-Cola: biodistribution: cytotoxicity: digestion.

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