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Accumulation of engineered nanoparticles in plant foods: Nutritional bioaccessibility and dietary exposure risks

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The increase in the production of engineered nanomaterials (ENMs) has prompted concerns about their environmental release into and their impact on human health. Consumption of plants that have come in contact with nanomaterials is the most likely route by which humans could be exposed. Collaborative study of ENM accumulation in plants is underway with research efforts focused on an array of belowground and leafy vegetables. One aspect of this research is focusing on the transport of various ENM into plant tissues. The accumulation data from these experiments is also being used to develop dietary intake models to relate that accumulation to the potential impact resulting from consumption of those plant tissues. Models based on a series of experiments with the accumulation of CuO, ZnO, or CeO₂ in carrot have been completed and include comparative data from plant exposed to the corresponding ions of each ENM. Additional modeling is underway for lettuce and sweet potato. A physiologically-based extraction test is being applied to assess the release during the gastric phase of simulated digestion. The goal of these efforts is to provide a comprehensive picture of the food safety risk posed by these ENMs in these plant foods.

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