The addition of nanoparticles to food has the potential to improve food quality, safety and nutrition. However, because of their small size, there is also the risk that ingested nanoparticles could damage cells or organs. Here we look at some of the nanoparticles used in foods and some of the potential risks. (For more on nanotech, see this month’s cover story “Still Plenty of Room at the Bottom,” beginning on p. 24.)

**Nano in Our Food**

The high surface-to-volume ratio of nanoparticles can make them very reactive or catalytic.

**TITANIUM DIOXIDE**

**USE:** Added in high quantities to over 900 food products as a whitening agent

**POTENTIAL RISK:** Affect of TiO₂ on gut microbiota could lead to inflammatory bowel diseases and colorectal cancer

**ZINC OXIDE**

**USE:** Added as a source of zinc in supplements and foods, or in food packaging as antimicrobial agents or UV light absorbers

**POTENTIAL RISK:** ZnO nanoparticles could cause hepatic injury, kidney toxicity, lung damage and cytotoxicity

**SILICON DIOXIDE**

**USE:** Added to powdered foods as anticaking agents to enhance flow properties

**POTENTIAL RISK:** High levels of SiO₂ nanoparticles may cause adverse effects, such as cytotoxicity and generation of ROS. Potential adverse effect on the liver and damage cell membranes

**ORGANIC NANOPARTICLES**

**USE:** Being developed as delivery systems to encapsulate, protect, and release hydrophobic bioactives, like colors, flavors, antimicrobials, antioxidants, nutrients, preservatives, vitamins and minerals

**POTENTIAL RISK:** Organic nanoparticles could enhance bioavailability of potentially toxic substances (like pesticides or hormones) or substances that are only toxic at high levels (like some fat-soluble vitamins)

**SILVER**

**USE:** Added as antimicrobial agents in foods and food packaging material

**POTENTIAL RISK:** Ag nanoparticles could accumulate in the body and have toxic effects when ingested at high levels and could also promote cytotoxicity

**CHRONIC EXPOSURE:** Chewing one piece of gum can result in an intake of 1.5–5.1 mg of TiO₂ nanoparticles

**Sources:** NPJ Science of Food, Frontiers in Nutrition, NIH and Wikipedia

Nanoparticles: Getty Images / Infographic by Alessia Kirkland