Effect of Food Constituents on Genotoxicity Induced by Silver Ions, Colloidal Silver and Silver Nanoparticles.

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Silver nano-particles (AgNPs) are used as antibacterial compounds in food contact materials and there are concerns that AgNPs can migrate into the food. Colloidal silver (colAg) is marketed as a dietary supplement. Silver ions (Ag+) and particles have been shown to be genotoxic partly due to induction of oxidative stress. Here, we investigated whether nutritional constituents such as glutathione and phytate with known antioxidant properties can protect the intestinal epithelial Caco-2 cells against DNA-damage induced by silver ions and particles.

AgNPs ($d_{\text{50,3}} = 9$ nm) in water and cell culture medium was characterised by dynamic light scattering and electron microscopy; colAg by UV-Vis spectrometry (surface plasmon resonance) and electron microscopy. Cellular uptake of glutathione and phytate was measured enzymatically and by HPLC, respectively. Ag+, colAg and AgNPs induced DNA strand breaks in Caco-2 cells in a dose dependent manner. Ag+ and colAg showed similar genotoxicity and both were more genotoxic than AgNPs. Both glutathione and phytate protected against genotoxicity induced by either silver ions or colAg or AgNPs. Thus, there are food constituents with antioxidant activity which are able to protect intestinal cells against genotoxic effects caused Ag+, colAg and AgNPs.