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In vivo human time-exposure study of orally dosed commercial silver nanoparticles

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Abstract

Human biodistribution, bioprocessing and possible toxicity of nanoscale silver receive increasing health assessment. We prospectively studied commercial 10- and 32-ppm nanoscale silver particle solutions in a single-blind, controlled, cross-over, intent-to-treat, design. Healthy subjects (n=60) underwent metabolic, blood counts, urinalysis, sputum induction, and chest and abdomen magnetic resonance imaging. Silver serum and urine content were determined. No clinically important changes in metabolic, hematologic, or urinalysis measures were identified. No morphological changes were detected in the lungs, heart or abdominal organs. No significant changes were noted in pulmonary reactive oxygen species or pro-inflammatory cytokine generation. In vivo oral exposure to these commercial nanoscale silver particle solutions does not prompt clinically important changes in human metabolic, hematologic, urine, physical findings or imaging morphology. Further study of increasing time exposure and dosing of silver nanoparticulate silver, and observation of additional organ systems are warranted to assert human toxicity thresholds.

From the clinical editor: In this study, the effects of commercially available nanoparticles were studied in healthy volunteers, concluding no detectable toxicity with the utilized comprehensive assays and tests. As the authors rightfully state, further studies are definitely warranted. Studies like this are much needed for the more widespread application of nanomedicine.

Trial registration: ClinicalTrials.gov NCT01243320 NCT01405794.

Keywords: Biological activity nanoparticles; Nanotechnology; Nanotoxicology oral ingestion; Safety research.