



Risks to tradespeople from spraying biocidal paint with silver nanoparticles

Occupational exposure risk while spraying biocidal paint containing silver nanoparticles

Gavin H. West, Fatima I. Castaneda, Leonard G. Burrelli, Daniel Dresser, Michael R. Cooper, Sara B. Brooks, and Bruce E. Lippy. *Journal of Occupational and Environmental Hygiene*, 2021.

Overview

Humans have known about the antibacterial properties of silver since ancient Greece. Today, manufacturers of construction products are using silver nanoparticles (AgNPs) to enhance an increasing number of materials, including lumber, flooring products, paints, and coatings. However, exposure to AgNPs may pose a health risk, and previous research has not evaluated this exposure risk among construction workers. The National Institute for Occupational Safety & Health (NIOSH) recently evaluated over 100 studies of silver nanomaterial toxicity and derived a recommended exposure limit (REL) of 0.9 $\mu\text{g}/\text{m}^3$ as an airborne respirable 8-hour time-weighted average concentration. For this study, CPWR researchers took air samples while a tradesperson sprayed two types of paint. One was a conventional paint, the other a biocidal paint containing AgNPs to prevent growth of bacteria, mold, and mildew, common hazards for building occupants and workers. This study included comparisons to exposure limits like the NIOSH REL and focused on better understanding exposure risks to workers who spray paints containing AgNPs.

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Read the abstract:

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Key Findings

- Prior to air sampling, no silver was detected in the conventional paint, while silver nanoparticles (AgNPs) from 5 to 20 nanometers were detected in the biocidal paint.
- Respirable silver concentrations were below detectable limits but greater than zero, given that free AgNPs were observed in air samples using a microscope.
- AgNPs observed by microscopy were primarily contained within larger paint spray droplets.
- Spraying either type of paint posed a risk of exceeding occupational exposure limits for total particulate, depending on task duration.
- Spray painting did not pose a risk of exceeding occupational exposure limits for total silver, AgNPs, nor respirable particulate. The low likelihood of exceeding the recommended exposure limit for AgNPs was related to the low level of respirable particulate generation.
- AgNPs appeared to comprise the total silver content in the paint mist (95% CI: 1.5–2.8 $\mu\text{g}/\text{m}^3$). Consequently, exceeding the recommended exposure limit would be more likely if different jobsite conditions or work practices, like a change in sprayer specifications, resulted in a finer paint mist with more respirable particles.



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