

Rampant use of antibacterial nanosilver is a resistance risk

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Credit: University of Technology, Sydney

Researchers at the University of Technology Sydney warn that the broad-spectrum antimicrobial effectiveness of silver is being put at risk by the widespread and inappropriate expansion of nanosilver use in medical and consumer goods.

As well as their use in medical items such as wound dressings and catheters, silver nanoparticles are becoming ubiquitous in everyday items, including toothbrushes and toothpaste, baby bottles and teats, bedding, clothing and household appliances, because of their antibacterial potency and the incorrect assumption that ordinary items should be kept "clean" of microbes.

Nanobiologist Dr Cindy Gunawan, from the itthree institute at UTS and

lead researcher on the investigation, said alarm bells should be ringing at the commercialisation of [nanosilver](#) use because of a "real threat" that resistance to nanosilver will develop and spread through microorganisms in the human body and the environment.

Dr Gunawan and institute director Professor Liz Harry, in collaboration with researchers at UNSW and abroad, investigated more than 140 commercially available medical devices, including wound dressings and tracheal and urinary catheters, and dietary supplements, which are promoted as immunity boosters and consumed by throat or nasal spray.

Their perspective article in the journal *ACS Nano* concluded that the use of nanosilver in these items could lead to prolonged exposure to bioactive silver in the [human body](#). Such exposure creates the conditions for microbial resistance to develop.

The use of silver as an antimicrobial agent dates back centuries. Its ability to destroy pathogens while seemingly having low toxicity on human cells has seen it widely employed, in treating burns or purifying water, for example. More recently, ultra-small (less than 10,000th of a millimetre) [silver nanoparticles](#) have been engineered for antimicrobial purposes. Their commercial appeal lies in superior potency at lower concentrations than "bulk" silver.

"Nanosilver is a proven [antimicrobial agent](#) whose reliability is being jeopardised by the commercialisation of people's fear of bacteria," Dr Gunawan said.

"Our use of it needs to be far more judicious, in the same way we need to approach antibiotic usage. Nanosilver is a useful tool but we need to be careful, use it wisely and only when the benefit outweighs the risk.

"People need to be made aware of just how widely it is used, but more importantly they need to be made aware that the presence of nanosilver has been shown to cause antimicrobial resistance."

What is also needed, Dr Gunawan said, is a targeted surveillance strategy to monitor for any occurrence of resistance.

Professor Harry said the findings were a significant contribution to addressing the global antimicrobial resistance crisis.

"This research emphasises the threat posed to our health and that of the environment by the inappropriate use of nanosilver as an antibacterial, particularly in ordinary household and consumer items," she said.

More information: Cindy Gunawan et al. Widespread and Indiscriminate Nanosilver Use: Genuine Potential for Microbial Resistance, *ACS Nano* (2017). [DOI: 10.1021/acsnano.7b01166](https://doi.org/10.1021/acsnano.7b01166)

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