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Bacterial Resistance to Antimicrobial Nanosilver

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Nanosilver is currently the most developed and commercialised antimicrobial nanomaterials. With proven efficacy against a broad spectrum of microorganisms, companies are now adding nanosilver as core antimicrobial ingredients in medical and personal care products, household appliances, as dietary supplements and even in baby products, just to name a few. The increasing use of nanosilver has raised global concerns with regard to the potential development of resistant microorganisms toward these nanoparticles. Here we report for the first time the natural ability of the near ubiquitously-occurring *Bacillus spp.* to adapt to nanosilver cytotoxicity upon prolonged exposure (Gunawan *et al.*, 2013). The combined adaptive effects of nanosilver resistance and enhanced extent of growth lead to the ultimate domination of the resistant bacteria in the microbiota, to which nanosilver is continuously applied. Importantly, we found that the adaptive effects are stable, in other words the effects are still present even following discontinuation of the nanosilver exposure. The observations of adaptation and ultimate domination of *Bacillus spp.* are relevant to wider microbiotas, presenting consequences of extensive microorganism exposure, including those that dwell in the human body, to bioavailable silver derived from the products. The discovery is an alert to the common perception of nanosilver as a risk-free antimicrobial.

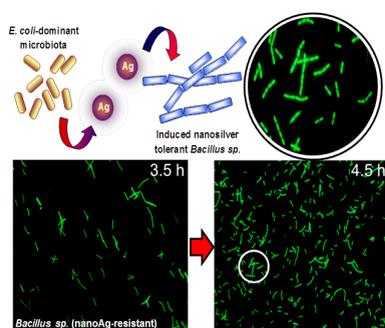


Figure 1. Rapid growth of nanosilver-resistant *Bacillus spp.* under toxic nanosilver exposure (Gunawan *et al.*, 2013; Gunawan and Marquis, Australasian Science, December 2013)

References

C. Gunawan, W. Y. Teoh, C. P. Marquis, R. Amal. *Small* (2013) 9, 3554-3560.

C. Gunawan, C. P. Marquis. *Australasian Science* (2013) December issue.

Biography:

Cindy Gunawan received her Bachelor of Engineering (Bioprocess Engineering) in 2002 and her PhD in Biotechnology in 2006 from The University of New South Wales (UNSW), Australia. She is currently a Chancellor's Research Fellow in the ithree Institute, University of Technology Sydney. Her research specialises on the fusion of cellular biology and nanomaterials engineering with expertise in the elucidation of nanoparticle-cell interactions.