EuroSciCon

6th Edition of International Conference on

Antibiotics, Antimicrobials and Resistance

October 11-12, 2018
Edinburgh, Scotland

Cindy Gunawan et al., J Infec Dis Treat 2018, Volume 4
DOI: 10.21767/2472-1093-C2-005

The emergence of bacterial resistance to nanoparticles

Cindy Gunawan[1,2], E Valentin[1], O McNeilly[1], A Bottomley[1], G ASotiriou[3], S A Rice[4], W Y Teoh[5], C P Marquis[2], R Amal[2] and **E J Harry[1]**

[1]University of Technology Sydney, Australia
[2]University of New South Wales, Australia
[3]Karolinska Institute, Sweden
[4]Nanyang Technological University, Singapore
[5]City University of Hong Kong, Hong Kong

As resistance to antibiotics rises rapidly, the ability to rely on other less conventional antimicrobials has assumed greater importance and this has led to the growing momentum in the engineering and applications of nanoparticles.Nanosilver (NAg) with its proven efficacy against broad spectrum of microbes, is currently one of the most commercialized antimicrobial nanoparticles. The nanoparticle has been incorporated in medical devices, such as wound dressings, catheters and implants, to prevent or fight infections. Companies have also been adding NAg in vast arrays of consumer products, from personal care, clothing to household appliances and even, baby products. The widespread use has fuelled an escalating concern for the emergence of resistant bacteria toward these nanoparticles. Our research group has found the natural ability of bacteria to adapt to NAg toxicity. These bacteria, ranging from environmental to clinically-relevant Gram-negatives and Gram-positives, developed unique adaptation responses under prolonged exposure to NAg. Some of these bacteria indeed exhibited resistance traits, capable to proliferate when in the presence of an otherwise toxic NAg dosages. We detected genomic mutations in these bacteria, and in some cases, even with no native prevalence of silver resistance determinants. These bacteria are capable to exhibit the resistance traits even after discontinuation of the nanoparticle exposure. The observations of the emergence of resistant bacteria are relevant to wider microbial communities, presenting consequences of extensive microorganism exposure, including those that dwell in the human body, to biologically active silver derived from NAg products.

Biography

Dr Cindy Gunawan is a nano-biologist with expertise in the fundamental and translational research of nanoparticle-cell interactions. She received her PhD in Biotechnology from the University of New South Wales (UNSW) and had her post-doctoral training in the School of Chemical Engineering UNSW. Dr Gunawan was then awarded the Chancellor's Research Fellowship to undertake research in the University of Technology Sydney (UTS). She is currently a Senior Lecturer in UTS and an Adjunct Senior Lecturer in UNSW. Dr Gunawan has published 24 papers, mostly in high impact journals.

cindy.gunawan@uts.edu.au