ANTIMICROBIAL RESISTANCE & INFECTION CONTROL

INNOVATION ACADEMY PRESENTATION Open Access

Inactivation of Pseudomonas aeruginosa by zinc oxide nanoparticles in aqueous solution

A Maleki[1*], M Ahmadi Jebeli[1], E Kalantar[1,2], H Daraei[1], B Davari[1,3], M Safari[1]

From 3rd International Conference on Prevention and Infection Control (ICPIC 2015)
Geneva, Switzerland. 16-19 June 2015

Introduction

Since ZnO nanoparticles (ZnO-NPs) exhibit strong antibacterial activities on a broad spectrum of bacteria the aim of this study was to evaluate the antimicrobial activity of Zno-NPs against *Pseudomonas aeruginosa* as a model for gram-negative bacteria.

Methods

The average size of Zno-NPs was 20 nm, as determined through scanning electron microscopy. Muller Hinton broth was used as a growing medium for *Pseudomonas aeruginosa*. Photocatalytic experiment was carried out in a laboratory-scale batch reactor with low pressure ultraviolet irradiation (380 nm). Different experimental parameters such as amount of Zno-NPs, contact time, inorganic and organic substances and pH on photocatalytic inactivation of *Pseudomonas aeruginosa cells* have been studied. An initial *Pseudomonas aeruginosa* concentration of 10^8 CFU/mL was used for all experiments.

Results

Result showed that, almost all the initial *Pseudomonas aeruginosa* cell (10^8 CFU/ml) was inactivated in 60 min in the presence of 2 g/l ZnO-NPs. Photocatalytic inactivation of bacteria was found to follow first order kinetics. The initial pH of the water did not play an important role on the inactivation rate within a range of 6–8 pH units. The amount of photocatalyst also plays an important role in photocatalytic inactivation rate. As the result showed increasing the photocatalyst amount provided more rapid inactivation.

Conclusion

Addition of some inorganic ions to the suspension affects the sensitivity of *Pseudomonas aeruginosa* and caused to retard the inactivation rates. Since the sensitivity of *Pseudomonas aeruginosa* to photocatalytic treatment was fairly good, it is therefore, recommended to use this nano-particle for water treatment.

Disclosure of interest

None declared.

Authors' details
[1]Kurdistan Environmental Health Research Center, Kurdistan University of Medical Sciences, Sanandaj, Iran, Islamic Republic Of. [2]Department of Microbiology and Immunology, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran, Islamic Republic Of. [3]Department of Medical Entomology, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran, Islamic Republic Of.

Published: 16 June 2015

doi:10.1186/2047-2994-4-S1-I6
Cite this article as: Maleki *et al.*: Inactivation of Pseudomonas aeruginosa by zinc oxide nanoparticles in aqueous solution. *Antimicrobial Resistance and Infection Control* 2015 **4**(Suppl 1):I6.

[1]Kurdistan Environmental Health Research Center, Kurdistan University of Medical Sciences, Sanandaj, Iran, Islamic Republic Of
Full list of author information is available at the end of the article