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Influence of copper and plastic surfaces on the survival of bacteria in relation to the health care environment

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Metallic copper (Cu) surfaces have antimicrobial properties against a variety of different microorganisms and copper touch surfaces are likely to be increasingly used in public places including hospitals. Studies in the literature show that molecular mechanisms result in the rapid killing of Cu surface-exposed bacteria and yeasts result from a sharp shock of extreme and immediate Cu-ion overload combined with severe membrane and cell envelope damage, although similar low mutation rates have been observed in cells obtained from both Cu and control surfaces. The aim of this study was to determine the survival of bacteria on the surfaces of copper and plastic plumbing surfaces. The antibacterial activity of copper surfaces was determined by overlying suspensions of *Staphylococcus aureus* and *Escherichia coli* on copper and plastic surfaces. All pipes were sterilized and bacterial suspensions from colonies were prepared and then the pipes were contaminated by the bacterial suspension. The experiments were performed at 18-23°C and the results were assessed after a 20-day exposure. The numbers of viable bacteria in the suspension were determined by serial dilution and plating on Nutrient Agar plates; the plates being incubated at 37°C for 48 h. The results showed that low counts of *Staphylococcus aureus* were seen on copper surfaces, as compared with those obtained on the plastic, control surfaces, i.e., the results show that *E. coli* failed to survive on copper pipes. The number of bacteria isolated from the plastic surfaces was consistently higher than the number isolated from copper surfaces. The survival rate of bacteria on the copper surfaces was low and none of the inoculated bacteria survived after 20 days of exposure. Copper is well known to be an antibacterial, and its use in medical environments is likely to the lead to the continuous reduction of environmental microbial contamination, including MRSA. The studies presented here show that the incorporation of Cu in healthcare facilities may dramatically help reduce the environmental microbial burden and act as a useful adjunct to current infection prevention and control systems, despite the fact that bacteria will eventually acquire resistance to the ion.

Biography

Rana Abdulrahim Alaeq is currently a PhD student in Department of Molecular Biology and Biotechnology, University of Sheffield, UK, under the supervision by Prof. (Hon. Cardiff) Milton Wainwright. In 2004, she awarded Master of Microbiology, Faculty of Science in Taibah University and Master of Medical Microbiology, Faculty of Biology, Medicine and Health in University of Manchester in 2013. She worked as a Teacher Assistant in Department of Medical Laboratory Technology, Faculty of Applied Medical Sciences, Taibah University and also cooperated in the educational laboratories of the Department of Medical Laboratory Technology like medical microbiology, medical parasitology and medical virology.

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