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Prevention of horizontal gene transfer of antibiotic resistance genes on touch surfaces

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H orizontal gene transfer (HGT) conferring resistance to various classes of antimicrobials has resulted in a worldwide epidemic of nosocomial and community infections caused by multidrug-resistant microorganisms, leading to suggestions we are returning to the pre-antibiotic era. Whilst studies have focused on HGT *in vivo*, this work investigates whether the ability of pathogens to persist in the environment, particularly on touch surfaces, may also play an important role. Here we show prolonged survival of multidrug resistant *Escherichia coli* and *Klebsiella pneumoniae* on stainless steel surfaces for several weeks. Plasmid mediated HGT of β-lactamase genes conferring resistance to third generation extended spectrum beta lactams and fourth generation carbapenems occurred to an azide-resistant recipient *E. coli* if donor and recipient cells were mixed together on contemporary stainless steel surfaces and in suspension but not on copper alloy surfaces. This transfer occurred almost instantaneously, even when the surface was dry and the pathogens survived many days of dry contact, providing an environmental hygiene risk and a reservoir for the acquisition and dissemination of new antibiotic resistant strains. In addition, rapid death of both antibiotic-resistant strains and destruction of plasmid and genomic DNA was observed on copper and copper alloy surfaces which could be useful in the prevention of infection spread and gene transfer in the healthcare and public transportation environments, particularly where cleaning and disinfection practice is not 24/7.

Biography

Charles William Keevil has completed his PhD at the University of Birmingham and Postdoctoral studies at University of Southampton, School of Biological Sciences. He is the Director of the Environmental Healthcare Unit and Head of the Microbiology Group. He has published more than 200 papers in reputed journals and is a Chartered Biologist with 40 years of experience of microbiology and biofilms. He also a Former Specialist Advisor to the House of Commons Science & Technology Committee; Fellow of the Royal Society of Biology, Fellow of the Royal Society of Medicine and Fellow of the American Academy of Microbiology and is also a winner of the Colgate Prize.

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