

# Metals versus microbes: The biocidal effect of metalloacid-coated surfaces

13 November 2012

A new study published in BioMed Central's open access journal *Antimicrobial Resistance and Infection Control* reports of a phenomenon that could help control the spread of hospital-acquired infections: a surface-coating of metalloacids kills off microbial strains, even in multidrug-resistant microorganisms.

Hospital infections are a major public health concern, causing an estimated 99,000 deaths a year in the USA alone. Cleaning and disinfecting surfaces greatly helps reduce these infections. In addition, previous studies have indicated that metalloacids could limit the ability of microorganisms to survive by producing oxonium ions (H<sub>3</sub>O<sup>+</sup>), which creates an acidic pH.

In this novel study, the authors from the Centre Hospitalier Universitaire de Tours and the Centre Hospitalier Universitaire de Besançon, France, set out to test the biocidal ability of molybdenum trioxide metalloacid-coated surfaces. To do this, they contaminated metalloacid-coated and non-coated surfaces by exposing them to microbial suspensions of eleven different microorganisms responsible for [hospital infections](#).

The microorganisms tested were two [Staphylococcus aureus](#) strains, *Clostridium difficile*, three extended-spectrum beta-lactamase-producing Enterobacteriaceae strains, vancomycin-resistant vanA *Enterococcus faecium*, *Pseudomonas aeruginosa*, multidrug-resistant *Acinetobacter baumannii*, and two fungal strains of [Candida albicans](#) and *Aspergillus fumigatus*.

The authors found that the metalloacid-coated surfaces exhibited significant [antimicrobial activity](#) in all non-spore-forming organisms tested within 2-6 hours of initial contact. The coated surfaces greatly limited the survival of microorganisms, whereas microorganism numbers remained substantial on non-coated surfaces. Interestingly, spore-forming organisms were completely

unaffected by the coated surfaces.

The biocidal reaction is thought to be caused by the diffusion H<sub>3</sub>O<sup>+</sup> ions through [microbial cell](#) membranes, resulting in altered enzyme transport systems and inhibited metabolic activity.

Lead author Nathalie van der Mee-Marquet thinks that the findings of this study could greatly aid hospitals in controlling infection. She said, "In contrast to disinfectants and antibiotics, microbial resistance to metalloacids may not emerge, and they should be safe for human use. A molybdenum trioxide coating may be an effective and permanent means of minimizing microbial contamination between hospital cleaning procedures, particularly against multidrug-resistant organisms."

van der Mee-Marquet suggests that further studies should evaluate the benefits of the coating on medical devices and gauge whether it can be used as a complementary measure in hospitals for preventing the spread of nosocomial infections.

**More information:** Biocidal activity of metalloacid-coated surfaces against multidrug-resistant microorganisms. Nathalie Tetault, Houssein Gbaguidi-Haore, Xavier Bertrand, Roland Quentin and Nathalie Van Der Mee-Marquet, *Antimicrobial Resistance and Infection Control* (in press)

Provided by BioMed Central

APA citation: Metals versus microbes: The biocidal effect of metalloacid-coated surfaces (2012, November 13) retrieved 13 October 2019 from <https://medicalxpress.com/news/2012-11-metals-microbes-biocidal-effect-metalloacid-coated.html>

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