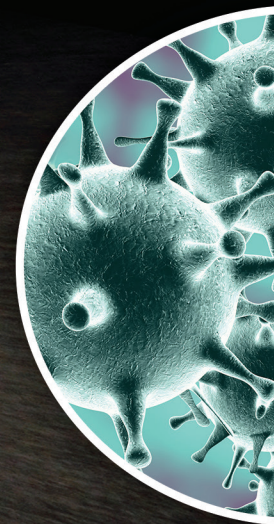


Antimicrobial Copper and ... *Human Coronavirus 229E*

Name of Study: Human Coronavirus 229E Remains Infectious on Common Touch Surface Materials

Authors: Sarah L. Warnes, Zoe R. Little, C. William Keevil, Centre for Biological Sciences, University of Southampton, Southampton, United Kingdom.

Published: mBio, November 10, 2015, 6(6):e01697-15 doi:10.1128/mBio.01697-15



Human coronavirus 229E (HuCoV-229E), which produces a range of respiratory symptoms from the common cold to more lethal outcomes such as pneumonia, can survive on surface materials including ceramic tiles, glass, rubber and stainless steel for at least five days. While human-to-human transmission can lead to infections, the virus can also be contracted by touching surfaces contaminated by respiratory droplets from infected individuals leading to a wider and more rapid spread.

Key Findings:

- On copper, and a range of copper alloys, the coronavirus was rapidly inactivated (within a few minutes, for simulated fingertip contamination). Exposure to copper destroyed the virus completely and irreversibly.
- Rapid inactivation of human coronavirus occurs on brass and copper nickel surfaces at room temperature (21°C). Brasses containing at least 70 percent copper were very effective at inactivating HuCoV-229E, and the rate of inactivation was directly proportional to the percentage of copper.
- Incorporation of copper alloy surfaces in conjunction with effective cleaning regimens and good clinical practice could help to control transmission of respiratory coronaviruses, including Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS).

Coronavirus Facts:

What is it?

- HuCoV-229E is associated with a wide range of respiratory diseases from mild colds to severe pneumonia in immunocompromised people and has been implicated as an autoimmune trigger in multiple sclerosis.

- The virus causes upper respiratory tract infection in healthy individuals and serious disease in patients with comorbidities. The low infectious dose means that this is a significant infection risk to anyone touching a contaminated surface.
- HuCoV-229E shares characteristics with MERS-coronavirus and also has an ancestral link with bats.

How is it Contracted?

- The virus is spread by droplets expelled by coughs and sneezes, which can also contaminate the environment from 2m to 6m (6.5 to 19.5 feet) away. A single droplet may easily contain an infectious dose.
- According to the authors of the study, coronavirus persistence on surfaces represents a considerable infection risk if contaminated surfaces are touched and infectious virus transferred to the mouth, nasal mucosa or conjunctiva.
- The risk of transmission increases in clinical facilities and possibly in other crowded public areas, as well as care homes and areas of mass transportation.

Where is it Prevalent?

- Enveloped respiratory viruses have been shown to persist on surfaces and contaminate more than 50 percent of surfaces in household and day care centers.
- Coronavirus persists in an infectious state on common surface materials for several days. An inoculum of 103 plaque forming units (PFU) persisted on polyfluorotetraethylene (Teflon; PTFE), polyvinyl chloride (PVC), ceramic tiles, glass, and stainless steel for at least 5 days (and 3 days for silicon rubber) at 21°C and a relative humidity of 30 percent to 40 percent.

Copper Facts:

This study was performed because copper alloys have previously been shown to be effective antimicrobial surfaces against a range of bacteria, fungi and viruses. A U.S. based study revealed that the use of copper surfaces in hospital rooms can reduce the number of healthcare-acquired infections (HAIs) by 58 percent. Six highly touched objects – bed rails, over-bed tables, chair arms, call button, computer accessories and IV poles – found in ICU rooms at three U.S. hospitals were retrofitted with copper touch surfaces for the study.

Brief Synopsis of Methodology:

Human coronavirus 229E were supplied by Public Health England (PHE), United Kingdom. Infected cell lysate preparations of HuCoV-229E were spread over coupons of the test surface and incubated at room temperature. Viral stocks were prepared by infecting cells at multiplicity of infection of 0.01 for 4 to 7 days until a significant cytopathic effect (CPE) was observed. Infected cells were subjected to 3 freeze/thaw cycles, and infected cell lysate was stored at 80°C. The virus was removed from the coupons at various times and assayed for infectious virus by a plaque assay.

To download the full study, visit <http://goo.gl/IZGA7i>.

This is part of an ongoing series designed to educate the public about individual studies conducted with copper and to explain its ability to continuously kill or inactivate bacteria, viruses and fungi that cause disease. To learn more about copper, visit www.antimicrobialcopper.com or www.copper.org.

Antimicrobial
Copper

