

Copper destroys human norovirus—fast!

June 8 2015

Metal alloys containing copper can destroy human norovirus, according to a paper published online ahead of print on May 15, in *Applied and Environmental Microbiology*, a journal of the American Society for Microbiology.

"Human norovirus is an unusually infectious microbe that causes stomach flu, including copious vomiting and diarrhea. It is a major problem on cruise ships, in restaurants, and in elder care homes, where the disease is easily transmitted by environmental contamination," said Clyde Manuel, a doctoral student in the laboratory of Lee-Ann Jaykus, of North Carolina State University, Raleigh. "This is the first study to demonstrate copper's destructive powers against human norovirus," said Manuel.

In the study, the authors obtained five different copper alloys, and [stainless steel](#) as a control surface, cutting these into coupon-sized pieces. "We deposited either human fecal samples containing infectious virus, or virus-like particles onto each coupon, and then tested survival of virus at various time points," said Manuel. (Virus-like particles are the shells of viruses, which have the same surface properties as infectious virus, and which are easier to grow than complete viruses.) The results: "A variety of copper surfaces had a major impact on the virus, whereas the virus was very stable on stainless steel surfaces."

The copper acted quickly. Ten minutes' exposure was sufficient to virtually abolish the receptor-binding ability of human norovirus [virus-like particles](#), an effect that was not observed on the stainless steel

surfaces.

Specifically, the copper surfaces destroyed both the virus' genome, and its capsid, or protein shell. "Perhaps these [copper surfaces](#) can be used on high touch surfaces, like door knobs, hand rails, and so forth, to prevent environmental transmission of the virus," said Manuel. He notes that a hospital intensive care unit that recently replaced other materials in high touch surfaces with copper reduced the overall infection rate by half.

The cycle of [virus](#) destruction begins when [copper ions](#) generate free radicals from water and oxygen, and sometimes from certain sulfur-containing amino acids. Free radicals react energetically with molecules such as DNA and proteins, damaging and often destroying them.

Manuel got the idea for this research from the science podcast, "This Week in Microbiology." "I was listening to episode 55, "In the copper room," and the authors were discussing recent papers showing that copper touch surfaces could actually reduce the rate of hospital acquired infections," he said. The dramatic results suggested to him that this method might be used to prevent environmental transmission of human norovirus, and to his surprise, he discovered that no-one had yet tested [copper](#)'s effect on that microbe. "So we quickly drew up an experimental plan and got to work!"

Provided by American Society for Microbiology

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