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Copper: The On Contact Bacteria Killer

<http://www.asm.org/index.php/news-room/dry-copper-kills-bacteria-on-contact.html?title=Dry+Copper+Kills+Bacteria+on+Contact>

A paper in the February 2011 issue of Applied and Environmental Microbiology has found that dry metallic copper surfaces are able to kill microbes on contact. Not only do these surfaces kill microbes, but it kills them at a very fast rate. As Gregor Grass of the University of Nebraska, Lincoln states, “When microbes were exposed to copper surfaces, we observed contact killing to take place at the rate of tens to hundreds of millions of bacterial cells within minutes, this means that usually no live microorganisms can be recovered from copper surfaces after exposure”. This is extremely useful for making a passively nearly sterile surface. Although these dry copper surfaces will not completely replace all surfaces in places like hospitals, Grass says that it will greatly decrease costs associated with hospital-acquired infections, as the effect from the copper surfaces does not "wear off".

This article relates to many of the topics we've studied in class, but I found it most relevant to our recent discussions on biofilms.

We've learned that biofilms can be very annoying or even dangerous in some situations, so having a surface that effectively kills most of the biofilm could be extremely useful. A passively biofilm-resistant material could be very beneficial for areas where biofilm elimination are necessary for everyday use. Hospitals and biomedical engineering are two key areas where dry copper could have a large effect. In biomedical engineering, if a bacteria killing surface is needed in an area where it can stay dry, then dry copper is a very cheap and effective way of creating such a surface. Currently hospitals spend more than $8 billion annually to keep hospital-acquired infections under control, and it still kills over 50,000 Americans annually. Being able to design a new set of surfaces for a hospital in which all bacteria are killed nearly instantly would be a huge time and money saver. The engineering challenge would be designing these surfaces so that the copper stays dry while also being as effective as possible as a surface, because the copper only has the antimicrobial properties when it is completely dry.

The article is significant because it shows a new way of creating a cheap sterile surface that does not wear away or create resistant bacteria. Dry copper kills bacteria in a unique way, which leads to no resistant strains of bacteria because the bacteria have no way of adapting. For the layman, this just means that the cost of maintaining a hospital can decrease if many of the surfaces are replaced with dry copper, as there is no need for sterilization or maintenance. Scientists can get even more benefit out of this study, however. As Grass says, "Critically, the researchers provide strong evidence that genotoxicity through mutations and DNA lesions is not a cause of dry copper’s antimicrobial properties. This is important, because mutations can cause cancer in animals and humans, and the lack of such mutations in bacteria from copper means that copper does not endanger humans. The relevant experiment was particularly interesting. The bacterium, Deinococcus radiodurans, is unusually resistant to radiation damage, as its DNA repair mechanisms are especially robust. The hypothesis: if metallic copper kills by causing DNA damage, D. radiodurans should be immune to copper. It is not." This brings a whole new idea to how we can control and kill bacteria and other microbes, in a way that is also safe to humans.