Human sweat can reduce bacteria defenses of door knobs and taps

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Sweaty hands can reduce the effectiveness of bacteria-fighting brass objects in hospitals and schools after just an hour of coming into contact with them, according to scientists at the University of Leicester.

While copper found in everyday brass items such as door handles and water taps has an antimicrobial effect on bacteria and is widely used to prevent the spread of disease, Dr John Bond OBE from the University of Leicester's Department of Chemistry has discovered that peoples' sweat can, within an hour of contact with the brass, produce sufficient corrosion to adversely affect its use to kill a range of microorganisms, such as those which might be encountered in a hospital and which can be easily transferred by touch or by a lack of hand hygiene.

Dr Bond explained: "The antimicrobial effect of copper has been known for hundreds of years. It is thought to occur as a result of a charge exchange between copper and bacteria, which leads to a degradation of the bacteria DNA. We have discovered that the salt in sweat corrodes the metal, forming an oxide layer on its surface, which is the process of corrosion - and this corrosive layer is known to inhibit the effect of the copper.

We have shown that it is possible for sweat to produce an oxide layer on the metal within an hour of contact.

"While it is well known that sweat corrodes brass, this is the first study to quantitatively analyse the temporal corrosion of copper alloys such as

brass in the first few hours after contact between fingerprint sweat concentrations of salt and the metal."

The research paper entitled 'Electrochemical behaviour of brass in chloride solution concentrations found in eccrine fingerprint sweat', published in the journal *Applied Surface Science* was co-authored by Elaine Lieu as part of a third year Interdisciplinary Science project investigating how easily and quickly sweat can corrode brass at the University of Leicester.

Dr Bond added: "Opportunities to improve hospital hygiene are being investigated by the University of Leicester from seemingly un-connected areas of research. This research is a different application of the study of fingerprint sweat corrosion of brass, applied to hygiene rather than to crime investigation.

"My short term advice is to keep the brass in public environments free from corrosion through regular and thorough cleaning. In the longer term, using copper alloys with corrosion inhibitors included in the alloy would be a good choice.

"While more research is needed in the study of sweat and brass corrosion, anywhere that needs to prevent the spread of bacteria, such as public buildings, schools and hospitals should be looking at using copper alloy on everyday items to help in avoiding the spread of disease."

Provided by University of Leicester