

# New type of antibiotic resistance living in hiding

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Aggressive infections constitute an increasing health problem all over the world. The development of bacterial resistance development is immense, and in the USA, resistant staphylococci cause more deaths than AIDS on an annual basis. Traditionally, antibiotic resistance is associated with genetic mutations in the bacteria, but researchers at the University of Copenhagen can now show that this is not necessarily the case:

We have shown that bacteria do not need DNA changes to demonstrate resistance to known antibiotics. Even though the genetic fingerprints of bacteria indicate one thing, their behaviour can, under special circumstances, change fatally, says Professor Hanne Ingmer, Department of Veterinary Disease Biology, University of Copenhagen.

## Coated overcoat

The researchers have found that the methicillin-resistant *Staphylococcus aureus* (MRSA) bacteria - which in themselves are quite serious - build up an even tougher and hardy cell wall if subjected to the drug colistin. The drug is used to treat serious bacterial infections. You could say that the bacteria change their expression when influenced by colistin, giving the 'overcoat' an extra coating. But the genetic core remains intact, enabling the resistant properties to live hidden from doctors and their test tools that specifically target genetically determined changes. It can have fatal consequences if a patient treated with colistin contracts a staphylococcal infection:

We can see that MRSA under the influence of colistin to an alarming degree behaves as the feared VISA bacteria, which are very hard to combat. The standard test is useless, as the resistance does not appear genetically, which can be decisive for major treatment failure in the healthcare sector, says Hanne Ingmer. She fears that there may be several drugs with the same effect, as results in the recently published study show that other antibiotics could also lead to this development of non-genetic resistance.

The research was conducted in collaboration with Stanford University by postdoc Jakob Haaber and PhD student Cathrine Friberg, Department of Veterinary Disease Biology.

## **The soldiers must be tested on the battlefield**

Our findings can be used to explain cases of incurable infections where antibiotic treatment should have worked. When you test for bacteria and cultivate samples in a Petri dish, the aggressive properties disappears. A demonstration of multi-resistant bacteria should therefore not just be based on bacterial genetics, but on bacterial properties in the body under attack. We need to find a way to test the [bacteria](#) while they - so to speak - are still fighting on the battlefield, concludes Hanne Ingmer.

The new research findings have just been published in *mBio* which is published by the American Society for Microbiology.

Provided by University of Copenhagen

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