Sclerosis medicine can fight multi-resistant bacteria

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Encountering bacteria with innocent names such as *Pseudomonas aeruginosa* and Enterobacteriaceae can lead to hospitalisation and - in a worst-case scenario - can also be life-threatening. The bacteria, which cause infections such as pneumonia, frequently develop multi-resistance towards classic antibiotics.

Researchers from Aarhus University have discovered that a drug known as glatiramer acetate, which is normally used for treating the disease multiple sclerosis, has a hitherto unknown effect on obstinate bacteria.

Laboratory experiments have shown that the drug kills half of the *Pseudomonas* bacteria in specimens from patients with cystic fibrosis who are often exposed to the bacteria in the lungs.

The research results have recently been published in the scientific journal *Scientific Reports*.

The discovery is good news at a time where multi-resistant bacteria are a growing problem.

"We see great perspectives in the discovery because our data shows that the drug is effective against infections that occur because of what are known as Gram-negative bacteria. These bacteria form the basis of diseases such as pneumonia, cystitis and septic shock. Due to growing resistance, we are experiencing a decline in the number of effective treatments against them, and some of the medicaments which we

otherwise know to be effective must be given in such high doses to be effective that they become toxic for the patients," explains Professor with special responsibilities (MSO) Thomas Vorup-Jensen from the Department of Biomedicine at Aarhus University.

According to a British survey commissioned by the British government, in 2050 resistant bacteria will all-in-all kill more people around the world than cancer. Neither the pharmaceutical industry or researchers have so far succeeded in developing new types of antibiotics that can beat the bacteria following classic strategies for the development of new medicines.

The research project is part of a new global movement within the development of medicine that focuses on medicine recycling or, as it is also called, repurposing. This is where researchers and companies test already approved medicines or substances on other diseases or functions of human biology than those they were originally developed for.

"It is extremely expensive to develop new medicines and it takes around ten years to get a medicament thoroughly tested and ready for patients. We cannot wait that long in the fight against resistant bacteria. Glatiramer acetate has been used to treat multiple sclerosis for over twenty years and is known to be a safe drug that does not cause many serious side effects. The fact that it now turns out to be anti-bacterial is completely new to us. This gives us the opportunity to develop a more effective treatment for patients with cystic fibrosis, for example, for whom we otherwise have had poor treatment options," says Thomas Vorup-Jensen.

The discovery also opens up for a new view of multiple sclerosis.

"The results give us greater knowledge about how the drug works on sclerosis patients and indicates at the same time that bacteria might be

part of the problem with the disease. This is also indicated by some studies," says Thomas Vorup-Jensen.

Aarhus University is collaborating with Aarhus University Hospital, Imperial College London, UK, Harvard Medical School, Boston, USA and the British pharmaceutical company Cycle Pharmaceuticals, who specialise in the recycling of medicine.

More information: Stig Hill Christiansen et al, The Immunomodulatory Drug Glatiramer Acetate is Also an Effective Antimicrobial Agent that Kills Gram-negative Bacteria, *Scientific Reports* (2017). DOI: 10.1038/s41598-017-15969-3

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