Resistance to antibiotics can be drawback for bacteria

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Neisseria meningitidis, the meningococcus, is a bacterium that can cause diseases with high fatality rates, and there has therefore been considerable concern that, like other bacteria, it might become resistant to antibiotics. But now a study from Örebro University and Örebro University Hospital in Sweden shows that there has not been any increase in resistant meningococci in Sweden over the last 15 years. According to researcher Sara Thulin Hedberg, the reason for this may be that it is not especially advantageous for bacteria to develop resistance.

Meningococci are usually harmless bacteria, and about one person in ten carries them in their throats or airways without knowing it. But they can also make their way into the blood and through the blood-brain barrier and cause blood poisoning and/or meningitis, and then the fatality rate is high, about 10 percent.

It has therefore been disturbing to see reports from most countries in recent years that meningococci have also begun to be more resistant to antibiotics. But now Sara Thulin Hedberg can establish in her doctoral dissertation in biomedicine that this is not the case in Sweden at present. Even though some of the bacteria have become resistant to individual preparations, they have not increased in number and do not seem to be spreading in society.

“We expected a more negative tendency, considering the dramatic increase in resistant bacteria in society, so these findings are both a surprise and a great relief,” she says.

Since meningococci are very good at adapting, using their ability to pick up parts of DNA from other bacteria in the same family, for instance, they have every chance of rapidly changing and developing resistance. But Sara Thulin Hedberg's research indicates that the biological cost is too great for the bacteria. In other words, it is not a formula for success to become resistant.

When she studied meningococci that had become resistant to rifampicin, an antibiotic, she discovered that they do not multiply as rapidly and are not as good at infecting a host. They are quite simply somewhat weaker and not as good at reproducing. This means that they have a hard time competing with susceptible meningococci as soon as they find themselves in an antibiotic-free environment.

The findings from Sara Thulin Hedberg's research may ultimately open new potential for combating resistant bacteria.

"By enhancing our knowledge of how bacteria change and are affected by developing resistance it may be possible to design antibiotics that bacteria find it more difficult to adapt to without excessive cost to themselves."

Provided by Örebro University