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Battle of the superbug

A UVic biochemist is hot on the trail of a new weapon in our war against a killer microbe

Boraston

by Melanie Tromp

As many of us suffer through another flu season, we try not to think about the "superbugs" that can cause debilitating and sometimes life-threatening complications.

But University of Victoria biochemist Alisdair Boraston thinks about superbugs all the time. He recently made a discovery that may help combat one of the nastiest superbugs out there.

A superbug is a drug-resistant bacterium. Boraston and his research team have been working with the *Streptococcus pneumoniae* bacterium, a superbug responsible for pneumonia, bacterial meningitis, ear infections and other diseases.

"When you get a drug-resistant strain of *Strep. pneumoniae,* what can you do about it?" asks Boraston, who is the Canada Research Chair in Molecular Interactions. "We need some alternate ways to treat these infections."

Boraston's research suggests that it may be possible to prevent the spread of the bacterium in the body without the use of typical antibiotics.

Boraston and his team recently verified that *Strep. pneumoniae* uses a specialized protein that targets the cells responsible for creating a soap-like protective coating in human lungs. This film keeps the lungs inflated and doubles as their number-one guard against attacking bacteria and other microbes.

"The next step is to figure out how to inhibit the action of the protein so that it can slow down or altogether prevent the germ from targeting these vital cells," says Boraston. "We're looking for things that slow it down."

Such a breakthrough would be the first step in developing a drug treatment that would give the body's immune system more time to fight the infection—an approach similar to current methods of treating the flu.

Despite the 90 forms of this bacterium out there, public concern has recently been focused on a specific strain of *Strep. pneumoniae* called 19A, which is resistant to all known pediatric antibiotics and is not covered by current childhood vaccinations.

"That's why this type of bacterium is now being called a superbug, because it's drug-resistant and can make people really sick," explains Boraston.

Because there is a known link between *Strep. pneumoniae* and the flu virus, a flu outbreak or pandemic could create a resurgence of this bacteria in the wider community. "If there are drug-resistant strains within that spread, we're in trouble," says Boraston.

Childhood vaccinations cover the seven most risky strains of *Strep. pneumoniae,* a medical practice that has caused the incidence of those types to decline. "But what about the other 83, or maybe more?" asks Boraston. "In some cases, they seem to be taking the place of the former seven and are becoming just as harmful.

"Basically, there's a real challenge to vaccinate people against this bug," he explains. "I am 100 per cent behind vaccine research and making it better. But we also have to get prepared for issues like disease replacement, antibiotic resistance and things like flu pandemics. This bug is constantly fighting back against us."

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Streptococcus pneumoniae is one of the world's leading causes of death from infectious disease, particularly in children and the elderly.

The flu, which is a viral illness, makes people more susceptible to infection with *Strep. pneumoniae*. Up to 20 per cent of flu deaths in regular flu seasons and up to 90 per cent of deaths during flu pandemics are due to secondary *Streptococcus pneumoniae* infections.

The *Strep. pneumoniae* bacterium lives in the back of the throat of up to 40 per cent of otherwise healthy individuals.

Alisdair Boraston is an international leader in the study of how proteins interact with sugars. His work is funded by the Canadian Institutes for Health Research, the Natural Sciences and Engineering Research Council, the Canada Foundation for Innovation and the British Columbia Knowledge Development Fund.

Boraston was recently named a Michael Smith Foundation for Health Research Scholar to continue his investigations into how *Strep. pneumoniae* proteins interact with lung cells.

UVic researchers were awarded more than $71 million in external research grants in 2006/07, doubling the average annual research support of the previous five-year period.