Cracking bacteria's secrets may lead to new treatments

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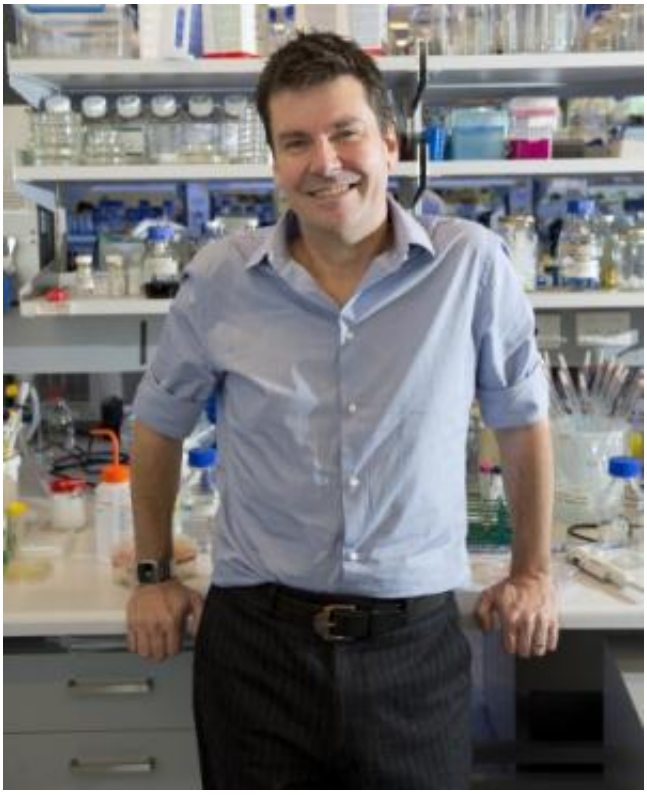

Professor Trevor Lithgow

(Phys.org) —Scientists have found another chink in bacteria's armour, mapping for the first time the structure of a protein that plays an important role helping infection gain a foothold in the body.

Published today in *Nature* a group of international scientists from

Monash University, the National Institutes of Health (NIH), the Georgia Institutes of Technology and the Diamond Light Source have determined the structure, in two species of bacteria, of an essential membrane protein called BamA.

Many membrane proteins are exposed on the surface of invading bacteria to help them avoid detection by the body's immune system while they establish sufficient populations to cause disease. As such, these proteins are regarded as excellent therapeutic targets to fight infectious diseases.

Co-author and Australian Research Council (ARC) Laureate Fellow Professor Trevor Lithgow of Monash University's School of Biomedical Sciences has focused on understanding the structure and function of BamA. His lab was the first to detail how BamA evolved to promote bacterial outer membrane synthesis, thereby providing a first line of defense against the immune system.

BamA is found only on Gram-negative bacteria, many of which are highly-resistant to antibiotics. The bacteria targeted by this research cause gonorrhoea and chanchroid, an STI common in developing nations, which is a risk factor for HIV.

Professor Lithgow said the findings were the result of a long term collaboration with Professor Susan Buchanan of the NIH, a world-leading structural biologist.

"These findings are an important stage in our long-term strategy to understand the very first steps in the invasion process – where the bacteria modify their outer surface properties - we may be able to stop the infection before it becomes established," Professor Lithgow said.

"These results bring us closer to understanding bacteria and exploiting

their weaknesses."

In further developments using super-resolution microscopy at the Monash Micro Imaging Facility, Professor Lithgow's team have focused in on the outer surfaces of individual bacterial cells to watch BamA at work.

Viewing the living bacteria in such unprecedented detail has revealed how complex the bacteria are in their ability to cloak themselves from the human immune system and establish full-blown infections. However, this complexity allows various opportunities to halt the infection process.

"Bacteria use highly complicated molecular machinery in the first stages of establishing their populations in the body. If we can knock out just one of the key aspects, we can disable the entire machinery," Professor Lithgow said.

More information: www.nature.com/nature/journal/ … ull/nature12521.html

Provided by Monash University