Sweet and sticky: Bacteria use sugars to bind to human cells

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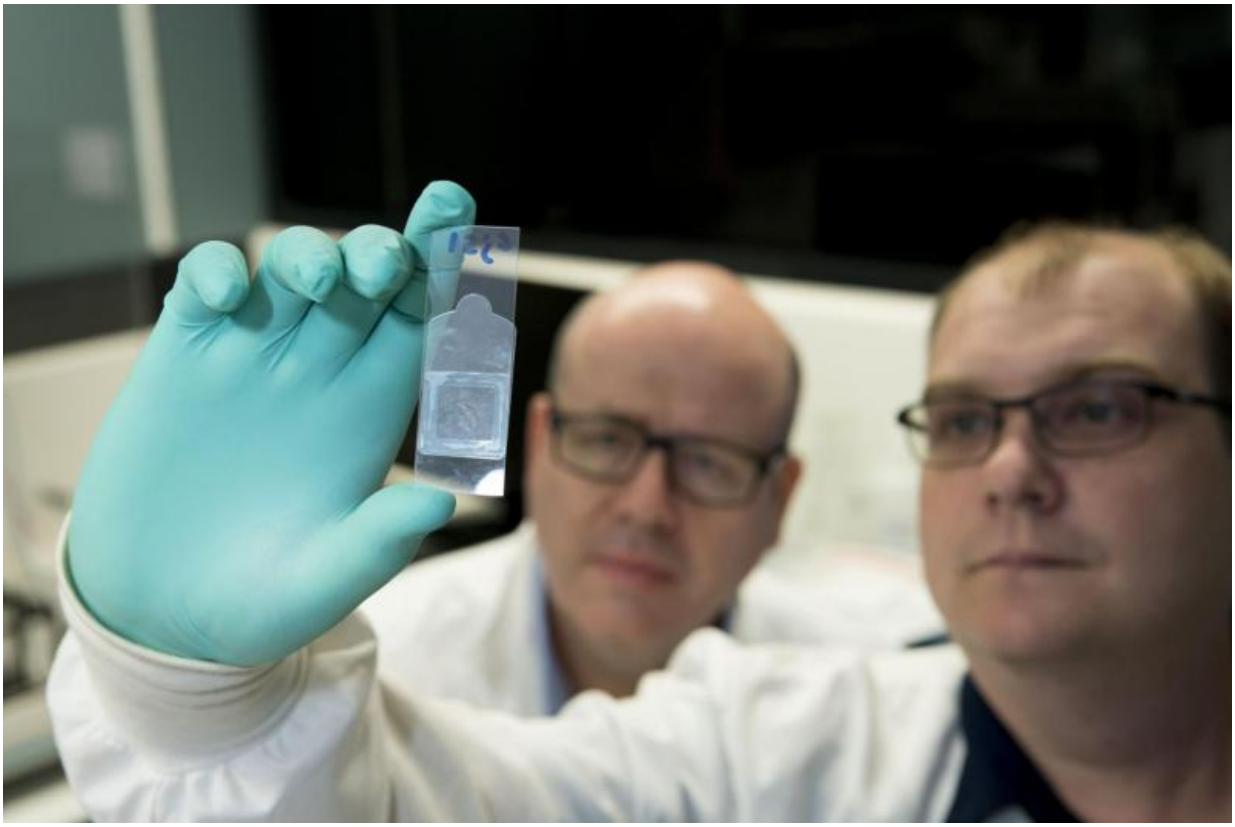

Institute for Glycomics researchers Professor Michael Jennings and Dr Christopher Day. Credit: Griffith University

A team at Griffith University's Institute for Glycomics has made a scientific discovery that will change the way scientists explore vaccine

development and drug discovery for infectious diseases.

In a paper published today in prestigious *American journal the Proceedings of the National Academy of Science*, the team led by senior authors Professor Michael Jennings, Professor Victoria Korolik and Associate Professor Renato Morona (University of Adelaide) shows an entirely new way that cells and macromolecules interact together.

Professor Jennings said the paper titled, 'Glycan:glycan interactions: High affinity biomolecular interactions that can mediate binding of pathogenic bacteria to host cells', shows that glycans—the complex sugar structures on cells linked to the spread of many diseases—can interact with each other at high affinity. Previous to this paper the interaction was not thought possible, or was considered a weak non-important interaction.

"We have discovered an entirely new way that cells and macromolecules interact with each other through interactions between bacterial glycan and human glycans," he said.

"To develop new drugs and vaccines you have to understand these biological processes and before this we did not know they existed so this finding opens up the opportunity for a range of approaches we can use to block infections."

Professor Jennings said the discovery was also a major contribution to fundamental science as well as the fight against infection disease and it would change the way the scientific community views these interactions in all living systems.

It also paved the way for the National Health and Medical Research Council to award funding of $1,059,344 for further research in this new untapped area.

The discovery was first made by Dr Christopher Day, whose observations couldn't be explained any other way than with the hypothesis that glycans can interact with other glycans at the cellular level.

The team, which also included Michael Apicella from University of Iowa, then set out to show over 60 high-affinity interactions in four different types of bacteria pathogens.

These included *Campylobacter jejuni*, *Salmonella typhimurium* and *Shigella flexneri*, which are all food borne bacteria as well as in *Haemophilus influenzae*, which causes illnesses such as pneumonia, chronic obstructive pulmonary disease and middle ear infections.

Professor Jennings said this discovery was important in understanding how bacteria cause disease in humans and developing drugs and vaccines to block these interactions.

Institute for Glycomics Director Professor Mark von Itzstein said this ground breaking research by Professor Jennings and his team demonstrates how the Institute makes invaluable contributions to Australian biomedical science and is considered a preeminent biomedical research Institute.

"Our research teams are made up of the best scientists from across the world," he said.

"This is yet another example of the exciting advances towards the discovery of new drugs, vaccines and diagnostics for significant diseases we are making here in the Institute for Glycomics."

More information: Glycan:glycan interactions: A new paradigm in biomolecular interactions that can mediate binding of pathogenic

bacteria to host cells, www.pnas.org/cgi/doi/10.1073/pnas.1421082112

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