New discovery in the microbiology of serious human disease

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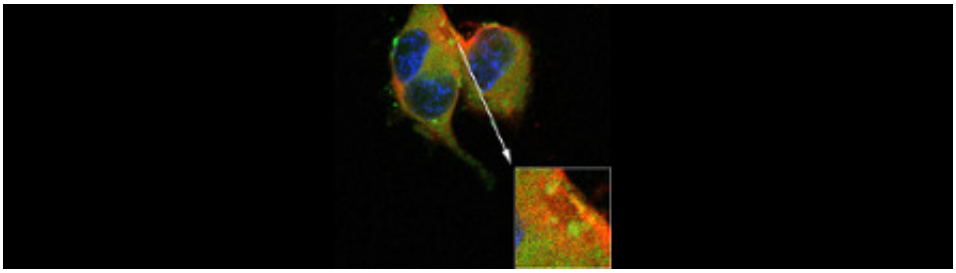

(Medical Xpress)—Previously undiscovered secrets of how human cells interact with a bacterium which causes a serious human disease have been revealed in new research by microbiologists at The University of Nottingham.

The scientists at the University's Centre for Biomolecular Sciences have shed new light on how two proteins found on many human cells are targeted by the human pathogen Neisseria meningitidis which can cause life-threatening meningitis and septicaemia.

The proteins, laminin receptor (LAMR1) and galectin-3 (Gal-3) are found in and on the surface of many human cells. Previous research has shown they play diverse roles in a variety of infectious and non-infectious diseases. For example, the LAMR1 is a key receptor targeted by disease-causing pathogens and their toxins and is also a receptor for

the spread of cancer around the body and for the development of Alzheimer's.

Using the latest bimolecular fluorescence and confocal imaging techniques, the researchers have shown that these two separate proteins can form pairs made up of two similar molecules (homodimers) or one of each molecule (heterodimers) which are targeted by Neisseria meningitidis. They have also identified critical components which cause the formation of these pairs of molecules.

These new mechanistic insights into the three-way relationship between proteins and bacterial pathogens could have significant implications in the fields of infection, vaccination and cancer biology.

Associate Professor of Microbiology, Dr Karl Wooldridge, said: "We have shown evidence for the self and mutual association of these two important proteins and their distinctive surface distribution on the human cell. We've also demonstrated that they are targeted by the serious human pathogen Neisseria meningitidis. This is significant because these proteins could potentially be used to develop new vaccines and treatments which could sabotage the colonisation of these dangerous bacteria, and also which could protect the blood-brain barrier which is disrupted in cases of bacterial meningitis."

Co-investigator Dr Jafar Mahdavi added: "One of the problems of studying laminin receptors is that there are at least two forms of LAMR1 found on the cell surface, called 37LRP and 67LR, and many previous studies have not sufficiently distinguished between the two forms. There are antibodies available but the specificity for the different types of laminin receptor had not previously been adequately reported. In our research we were able to identify which antibody detects which specific type of receptor.

The paper, published today in the Royal Society journal *Open Biology*, will inform the whole field of laminin receptor research, not just infection. The team at Nottingham says that by examining bacteria as model organisms which have learned how to manipulate cell biology systems, they may gain insights into how medical science can manipulate cell systems for cancer treatment, Alzheimer's disease and other diseases associated with the laminin receptor.

More information: The study is available online: rsob.royalsocietypublishing.or … /content/4/10/140053

Provided by University of Nottingham