Researchers make significant strides in identifying cause of bacterial infections

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Several bacterial pathogens use toxins to manipulate human host cells, ultimately disturbing cellular signal transduction. Until now, however, scientists have been able to track down only a few of the proteins that interact with bacterial toxins in infected human cells.

Now, researchers of the Max Planck Institute of Biochemistry in Martinsried and the Max Delbrück Center for Molecular Medicine (MDC) Berlin-Buch in Germany have identified 39 interaction partners of these toxins, using novel technology which allowed them to screen for large numbers of proteins simultaneously (*Cell Host & Microbe*, Vol. 5, Issue 4, 397-403).

Many bacteria inject toxins into human cells using a secretion system that resembles a molecular syringe. Within the host cell, some of these toxins are activated in such a way that they can manipulate important cellular signaling pathways. In healthy cells, these signals serve to regulate metabolism or cell division, among other things. By manipulating the signals, bacteria can abuse the cell machinery of the human host in order to spread and survive.

Applying a method developed by Professor Matthias Mann of the MPI, the scientists succeeded for the first time in systematically investigating the cellular target sites of the bacterial toxins. "Surprisingly, the toxins are not optimally adapted to the structures of human proteins," Dr. Matthias Selbach of MDC explained. While binding relatively weakly to individual human proteins, they are able to influence several different

proteins simultaneously. "A single bacterial toxin seems to function like a master key that can access different host cell proteins in parallel", Dr. Selbach said. "Perhaps it is due to this strategy that bacteria are able to attack very different cells and, thus, to increase their survival chances in the host."

Dr. Selbach hopes that these basic research findings will help to improve the treatment of bacterial infections in the future. Instead of nonspecific antibiotic therapy, new drugs could target the signaling mechanisms which are disrupted by the bacterial toxins.

Source: Helmholtz Association of German Research Centres (news : web)