Scientists reveal how cholera bacterium gains a foothold in the gut

January 27 2012

(PhysOrg.com) -- A team of biologists at the University of York has made an important advance in our understanding of the way cholera attacks the body. The discovery could help scientists target treatments for the globally significant intestinal disease which kills more than 100,000 people every year.

The disease is caused by the bacterium Vibrio cholerae, which is able to colonise the intestine usually after consumption of contaminated water or food. Once infection is established, the bacterium secretes a toxin that causes watery diarrhoea and ultimately death if not treated rapidly. Colonisation of the intestine is difficult for incoming bacteria as they have to be highly competitive to gain a foothold among the trillions of other bacteria already in situ.

Scientists at York, led by Dr. Gavin Thomas in the University's Department of Biology, have investigated one of the important routes that V. cholera uses to gain this foothold. To be able to grow in the intestine the bacterium harvests and then eats a sugar, called sialic acid, that is present on the surface of our gut cells.

Collaborators of the York group at the University of Delaware, USA, led by Professor Fidelma Boyd, had shown previously that eating sialic acid was important for the survival of V. cholerae in animal models, but the mechanism by which the bacteria recognise and take up the sialic was unknown.

The York research, funded by the Biotechnology and Biological Sciences Research Council (BBSRC), demonstrates that the pathogen uses a particular kind of transporter called a TRAP transporter to recognise sialic acid and take it up into the cell. The transporter has particular properties that are suited to scavenging the small amount of available sialic acid. The research also provided some important basic information about how TRAP transporters work in general.

The leader of the research in York, Dr Gavin Thomas, said: "This work continues our discoveries of how bacteria that grow in our body exploit sialic acid for their survival and help us to take forward our efforts to design chemicals to inhibit these processes in different bacterial pathogens."

The research is published in the latest issue of the *Journal of Biological Chemistry* and was primarily the work of Dr Christopher Mulligan, a postdoctoral fellow in Dr. Thomas's laboratory.

More information: The paper 'The Membrane Proteins SiaQ and SiaM Form an Essential Stoichiometric Complex in the Sialic Acid Tripartite ATP-independent Periplasmic (TRAP) Transporter SiaPQM (VC1777–1779) from Vibrio cholera' is published in *The Journal of Biological Chemistry*, Vol. 287, Issue 5, 3598-3608

Provided by University of York