New research may help to design better gene therapy vectors

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(PhysOrg.com) -- Research published by scientists from the University of Reading may offer an insight into ways of making safer and more specific gene therapy vectors. The research, published in the journal *Nature Structural and Molecular Biology*, describes the structure of the viral fusion protein gp64, which is involved in the mechanism which viruses use to invade host cells. In the past, Bacloviruses have been suggested as possible gene therapy vectors due to the way in which they enter host cells, but there has been little evidence which explain these properties up to now.

Viruses are unable to grow or reproduce outside a host cell. Entry of a virus into a living cell is driven by molecules on the virus' envelope known as viral fusion proteins. Bacloviruses are a group of viruses which primarily infect invertebrate cells. One of the viral fusion proteins found on Baclovirus is gp64.

It is necessary for cell entry and mediates receptor binding, a decrease in pH which triggers membrane fusion and facilitates Baclovirus entry into many types of mammalian cells. Another interesting property of gp64 is that it can also easily incorporate peptides into the virus DNA. Taken together, this suggests that Baclovirus may be a useful gene-delivery vector.

Gene therapy is the insertion of genes into an individual's cells and tissues to treat a disease in which defective genes are replaced with functional ones. In the future, gene therapy may be able to provide

potential cures to diseases such as cystic fibrosis, hemophilia, muscular dystrophy and sickle cell anemia. In order for the therapy to work, the gene must be incorporated into the genome and a carrier, or vector, must be used. One of the problems with the use of gene therapy at the moment is that the vectors available are largely considered to be unsafe, and this research may therefore offer ways of making safer and more specific gene therapy vectors.

The research was carried out in collaboration with scientists at the University of Oxford and EMBL Grenoble. Professor Ian Jones from the School of Biological Sciences at the University of Reading said "this research has greatly increased our understanding about viral fusion proteins and how viruses get into cells. We hope that in the future this may lead to safer and more specific gene therapy vectors."

Provided by University of Reading