Key mechanism behind herpes revealed

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Researchers at Lund University in Sweden have for the first time managed to measure the internal pressure that enables the herpes virus to infect cells in the human body. The discovery paves the way for the development of new medicines to combat viral infections. The results indicate good chances to stop herpes infections in the future.

A virus comprises a thin shell of protein, within which are its genes. A long-standing theory has been that a virus has high internal pressure because it is so tightly packed with genetic material. The pressure means that they can infect a cell by ejecting the genes at high force and speed. The cell is then duped into becoming a small 'virus factory' that produces new viruses, multiplying the number. However, no one has previously succeeded in measuring the internal pressure of a virus that can infect humans.

Biochemist Alex Evilevitch from Lund University and Carnegie Mellon University in Pittsburgh, USA, has measured the pressure inside the herpes virus HSV-1 (herpes simplex virus 1) together with a research team in the US. The study has been published in the *Journal of the American Chemical Society*, *JACS*.

"The pressure explains the way all eight known herpes viruses that infect humans inject their genes into our cells", said Alex Evilevitch.

This includes both of the two most common forms of herpes, which cause cold sores and genital herpes, as well as Varicella zostervirus, which causes chickenpox and shingles, Epstein-Barr virus, which leads

to glandular fever, and viruses linked to various forms of cancer.

In previous studies, Alex Evilevitch has also demonstrated that bacteriophages, viruses that infect bacteria, have a high internal pressure. Bacteriophages and herpes viruses separated in evolution billions of years ago, but have retained the same pressure-driven method of ejecting their genes. Evilevitch therefore believes this must be a key mechanism for viral infection.

The discovery could lead to new drugs. The medication that exists to combat viral infections is very specialised and if a virus mutates, which often happens, the medicine can become less effective. However, if a treatment could be developed that reduces the pressure within the virus shell, it would probably be possible to fight many different types of viral infection with the same drug. In addition, the medication would work even if the virus mutated, because mutations do not affect the internal pressure of a virus.

"The results of the present study are the first step towards the goal of developing a drug of this type, and we already have positive preliminary data that shows that the herpes infection can be stopped. It feels great to know that this research will help to fight infections that are as yet incurable", said Alex Evilevitch.

Provided by Lund University

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