

## Scientists explore new ways to counteract viral infections

For the first time the research world has managed to measure the energy that is used when a virus infects a cell. The aim is to find a way to reduce the amount of energy inside the virus and thereby ultimately find a medicine that can counteract infections. A group of chemistry researchers from Lund University in Sweden and from the University of Lyon in France lie behind the study.

On the borderline between chemistry and physics, scientists are finding new and exciting ways to understand how viruses function. Biochemist Alex Evilevitch from Lund University has long been interested in the more physical aspects of how viruses infect cells, both in humans and in bacteria (bacteria can in fact become infected by viruses).

In earlier research, Alex Evilevitch has shown that viruses evince extremely high internal pressure, as high as the pressure at a depth of 500m below sea level. Or, for that matter, pressure that is 10 times more powerful than in an unopened bottle of champagne. This pressure functions as the virus's weapon when it attacks.

"The pressure enables the virus to insert its genes at high speed into the cell it is infecting," says Alex Evilevitch.

### Our genes are 'fooled'

A virus consists of a thin protein coat that encapsulates its genes. When the virus has managed to infect a human cell, for example, the human's own genes are fooled into copying the genes of the virus, which help the virus multiply inside the human body. The problem in finding medicines for virus infections is that viruses mutate at a rapid pace, that is, their genes are constantly changing, which makes it difficult to get a handle on them.

Alex Evilevitch and his colleagues are therefore seeking a solution by following another lead, with the help of physics. His research team is trying to find a way to regulate the pressure inside the coat of the virus. They want to lower the pressure in order to neutralise the virus. To be able to lower the pressure, they need to reduce the amount of energy inside the virus.

### A world first

The three Swedish scientists Alex Evilevitch, Professor Bengt Jönsson, and doctoral candidate Meerim Jeembaeva, along with their colleague Martin Castelnovo in France, are the first researchers in the world to succeed in measuring this amount of energy. They have used an instrument, a so-called calorimeter, which can measure the generation of heat at the very moment of infection, that is, when the virus sends off its genes with the help of its internal pressure.

The research team has also shown that the amount of energy in the virus is governed by the amount of water inside the coat of the virus. The scientists have therefore focused on developing methods for controlling the amount of energy in the virus by controlling the amount of water it contains. The research findings are now being published in *Journal of Molecular Biology*.

Alex Evilevitch says that there is great interest in this research field among clinical and molecular virologist that is, virus researchers working in medical science.

Source: Lund University

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