

5. VirX – Finding new ways of fighting viral infections

Viruses represent one of the major health threats to humans, and yet for the majority of viruses, there are no vaccines available. Antiviral drugs usually target viral proteins, and as such may quickly lose their efficacy due to mutations. The VirX project is exploring a cellular pathway that was recently identified as being employed by the influenza virus to infect human cells. This could lead the way for new approaches to combatting viruses.

“The VirX project is using a bottom-up approach,” says Patrick Matthias, Senior Group Leader at the Friedrich Miescher Institute and project leader of the MRD Project. “Unlike many other systems biology projects, our starting point is not based on large-scale screenings with lots of data points. Instead, we are starting by looking at the interactions between a few cellular proteins, and investigating how these are involved in the infection of a cell by the influenza virus.”

A number of cellular proteins play a role in infection by viruses such as influenza. The new cellular pathway examined in this project involves the deacetylase HDAC6, motor proteins such as dynein and myosin and also the small protein ubiquitin; together, these components form a module which helps the virus infect the cell. The virus is then able to release its genome into the cytoplasm, before it is transcribed and replicated in the cell nucleus.

The molecular interactions of these proteins form the basis of the VirX project. They are being closely investigated with the goal of developing three-dimensional and mathematical models. Yet the involve-

ment of additional factors has not been ruled out. “It is entirely possible that other proteins also form part of this module,” adds Matthias.

The team will then test a number of molecules that may interfere with the cellular pathway and thus hopefully limit the virus’s entry into the cell. This could lay the foundation for new antiviral medication. Furthermore, the group is interested in whether the

same cellular proteins also play a part in infections by other viruses, for example rhinoviruses – the cause of the common cold.

For Matthias, systems biology plays a key role in today’s research. “This way of working enables us to adopt a truly interdisciplinary approach which is still curiosity-driven. It allows us to paint a more complete picture of complex processes, allowing scope for new discoveries and hypotheses.”

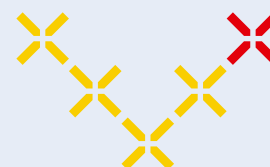
VirX at a glance

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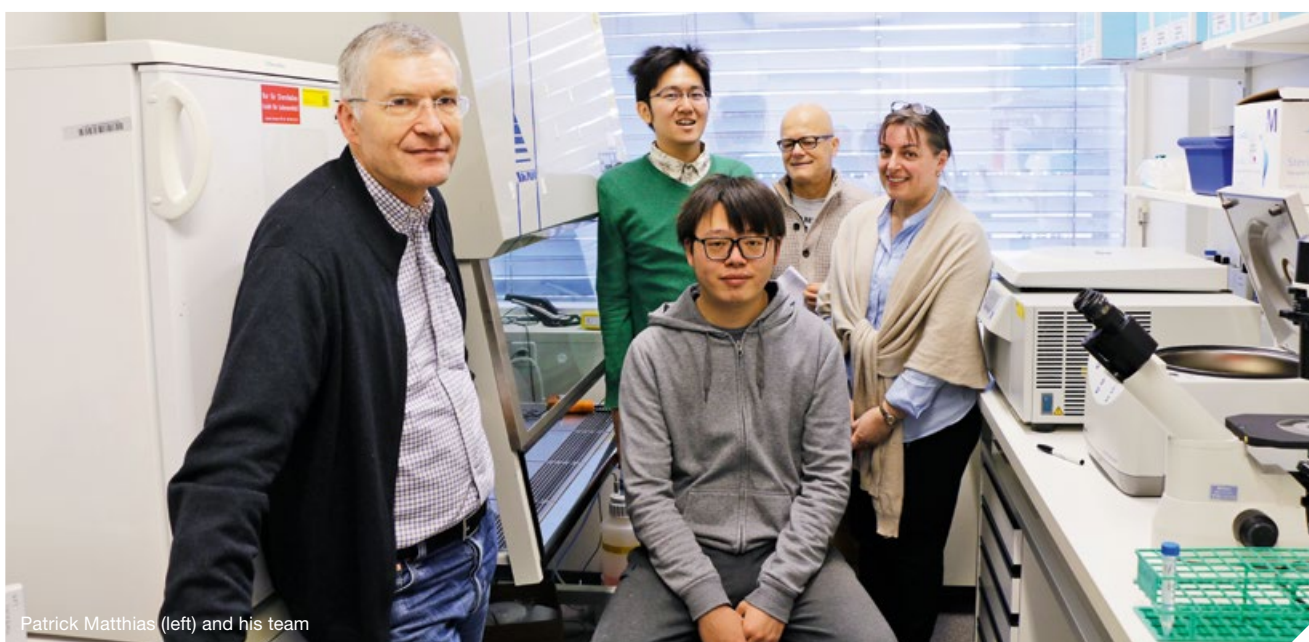
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VirX
A Host-Directed
Approach Against
Viral Disease



Patrick Matthias (left) and his team