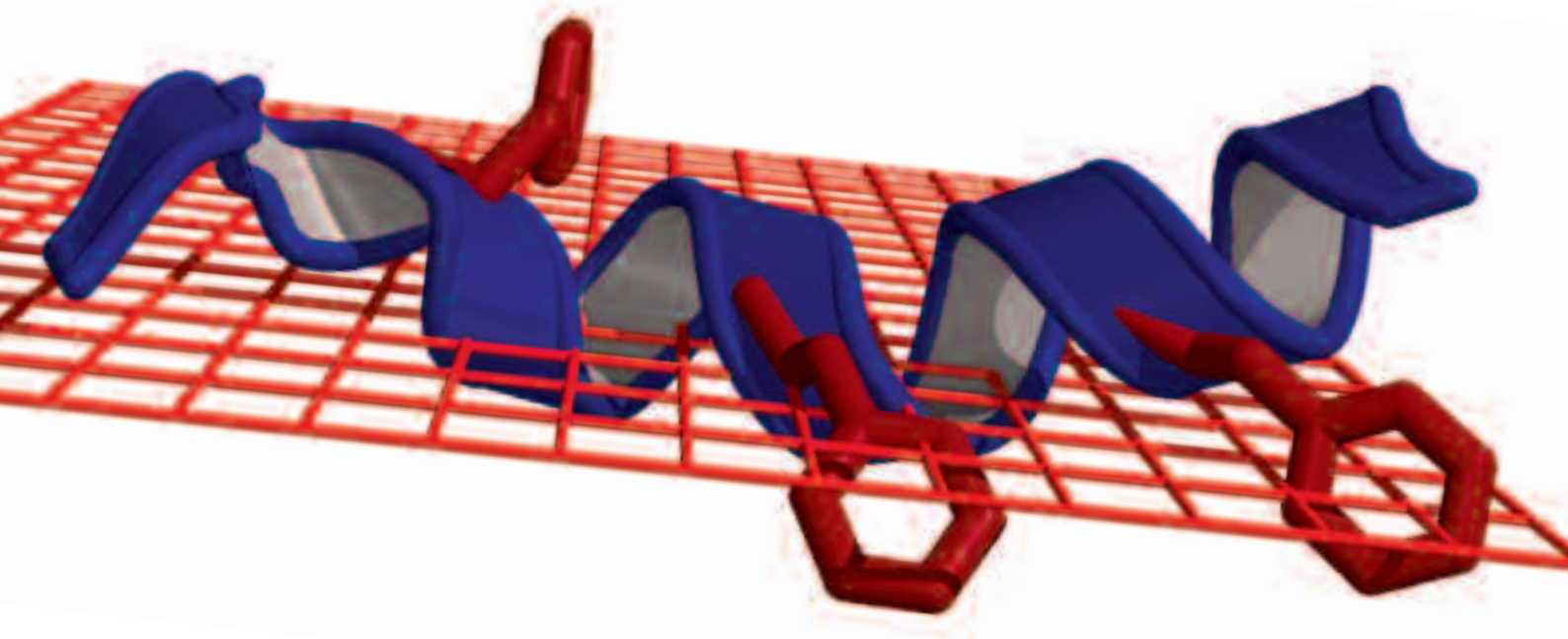
Arresting viral infection



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Until now, scientists' understanding of the merging and separation of membranes has been limited. The knowledge that does exist was derived from crystallography, the study of the structures of crystallized protein-membrane complexes. But because cell membranes are hard to crystallize, only a few such structures have ever been deciphered.

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In 1998, Dr. Jeremy Bradshaw of the University of Edinburgh's Royal (Dick) School of Veterinary Studies and Dr. John Katsaras of the NRC's Steacie Institute for Molecular Sciences, Chalk River, teamed up to acquire new information about cell-membrane destabilisation using a method other than crystallography.

Combining Dr. Katsaras' expertise in neutron diffraction with Dr. Bradshaw's knowledge of protein-membrane interactions, they analyzed a particular class of small proteins—viral fusion peptides. These proteins enable a virus such as influenza or human immunodeficiency virus (HIV) to fuse with a host cell membrane and infect the cell.

The researchers published the results of their studies in a series of papers. In recognition of their progress and in support of an extended collaboration, they received a Researcher Exchange Award.

In July 2001, Dr. Bradshaw returned to Chalk River where he, Dr. Katsaras and Dr. Thad Harroun of the NRC's Canadian Neutron Beam Centre—a former member of the Edinburgh group—investigated a fusion peptide from the simian immunodeficiency virus (a relative of HIV).

Again using neutron scattering techniques, the researchers deduced in outline how fusion occurs, and in detail how the peptide positions itself in the host cell membrane.

With the use of computer modelling, they now hope to use this atomic-level information to explain how the peptide destabilizes the lipid molecules of the cell membrane, allowing the cell to become infected. This research is of major importance, as it could lead to the development of new and better antiviral drugs.

tharroun@brocku.ca
j.bradshaw@ed.ac.uk
john.katsaras@nrc-cnrc.gc.ca