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Press release

**Biofilms:
discovery of a new mechanism of virus propagation**

Researchers at the Institut Pasteur and CNRS have shown for the first time that certain viruses are capable of forming complex biofilm-like assemblies, similar to bacterial biofilms. These extracellular infectious structures may protect viruses from the immune system and enable them to spread efficiently from cell to cell. "Viral biofilms" would appear to be a major mechanism of propagation for certain viruses. They are therefore emerging as new and particularly attractive therapeutic targets.

Researchers from the Institut Pasteur and CNRS, headed by Maria-Isabel Thoulouze and Andrés Alcover within the Lymphocyte Cell Biology Unit, in collaboration with Antoine Gessain from the Oncogenic Virus Epidemiology and Physiopathology Unit and with the Imagopole, recently identified, for the first time in viral research, "biofilm" like structures, formed by the HTLV-1 retrovirus on the surface of infected cells. These are aggregates of viruses embedded in a carbohydrate-rich structure containing cell-secreted extracellular matrix, whose synthesis is controlled by the virus.

The HTLV-1 virus (human T-cell leukemia virus type 1) was the first human retrovirus to be isolated, in 1980, three years prior to the discovery of HIV, the retrovirus that causes AIDS. It infects 15 to 20 million people worldwide and causes various diseases, ranging from adult T-cell leukemia/lymphoma to forms of neuromyelopathy (tropical spastic paraparesis) or other chronic inflammatory syndromes, such as infectious dermatitis, uveitis and myositis. The dissemination of HTLV-1 was known to require infected cells and cell-cell contacts, but the transmission mechanism itself was still a mystery.

In the biofilm – an effective protective and adhesive barrier – HTLV-1 is far more easily transmitted than in its free, isolated state. By removing the viral biofilm from the surface of the

infected cells, researchers achieved an 80% reduction in infection rates, thus underlining the importance of this transmission mode for HTLV-1.

In bacteria, the existence of biofilms has been known for many years. They form the dental plaque on the enamel surface of teeth and are also found in industrial systems and in our own intestinal flora. When they colonize medical implants, such as prosthesis or catheters, they can cause repeated infection. For these reasons, bacterial biofilms have been the focus of intensive research in the aim to limit their development and render them responsive to anti-bacterial treatment.

Scientists are currently seeking to characterize the mechanisms of viral biofilm generation, and to determine whether viruses other than HTLV-1 form this kind of structure. For viruses forming biofilms, it would be useful to define new anti-viral therapeutic strategies, which would target, not only the virus itself, but the formation of these viral biofilms.

For further information about the HTLV virus

Read our fact sheet (in French):

<http://www.pasteur.fr/ip/easysite/go/03b-00000j-0h9/presse/fiches-sur-les-maladies-infectieuses/htlv>

Source

Biofilm-like extracellular viral assemblies mediate HTLV-1 cell-to-cell transmission

at virological synapses, *Nature Medicine*, advanced online publication December 20, 2009.

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