T-cell 'nanotubes' may explain how HIV virus conquers human immune system

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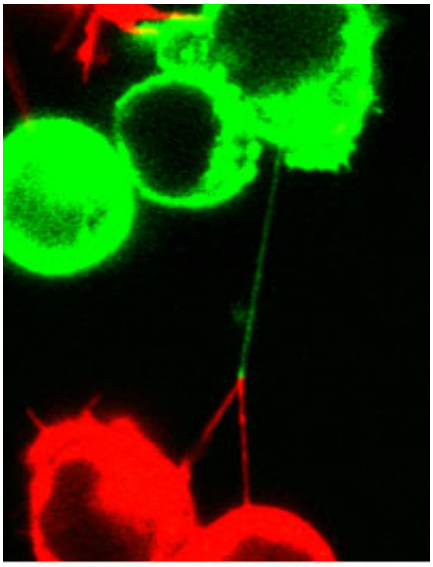

A membrane nanotube links three T-cells that have previously bumped into one another

String-like connections found between T-cells could be important to how HIV spreads between cells in the human immune system, according to new research published online yesterday in *Nature Cell Biology*. The newly-discovered strands, named 'membrane nanotubes' by scientists, could help to explain how the HIV virus infects human immune cells so quickly and effectively.

The new laboratory-based cellular study shows that when human T-cells bump into each other and then move apart again, a long string of membrane is sometimes formed, creating a connection between the two cells.

Scientists found that these membrane nanotubes can stretch out between the two cells as they move apart, sometimes several cell lengths away from each other. In lab tests mimicking the environment of the human body in 3D, the research team also found that the strings are flexible and can bend to keep cells connected.

After discovering the T-cell nanotubes, the researchers infected some of the T-cells with HIV modified to include a fluorescent protein. They observed that HIV proteins travelled down the nanotubes from infected cells to non-infected cells.

The scientists suggest that if this mechanism was proven to occur in the human body, as well as in the lab, it may help to explain why extra-cellular antibodies are unable to fight HIV effectively.

One of the authors of the study, Professor Dan Davis from Imperial College London's Department of Life Sciences, explains: "Discovering that these membrane nanotube links exist between T-cells indicates that there may be as-yet undiscovered ways that these types of cells communicate with each other inside the human body.

"Our preliminary results indicate that the nanotubes could play a role in transmitting the HIV virus between immune cells, though this is a very early-stage study," says Professor Davis. "We cannot assume that what we have found in the lab necessarily mirrors exactly what happens in the human body."

This kind of link has previously been observed forming between other

kinds of cells, including brain cells and other kinds of immune system cells, but this is the first time that it has been found in T-cells. A similar kind of link is created when cells divide to create new cells, but the newly-discovered nanotubes are different because they have distinct break, or junction, where the membrane material from each of the two cells meets.

Professor Davis adds that it is possible that other viruses could move along these nanotubes from cell to cell, but that further research is needed to establish whether or not these nanotubes form in the same way in the human body. "If they do, this mechanism of virus transmission could open new avenues for drug targets," he says.

Source: Imperial College London