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Researcher discovers how new HIV vaccine candidate can control HIV progression

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(PhysOrg.com) -- Researchers from the University of Toronto and Mount Sinai Hospital have made significant findings about how a new HIV vaccine candidate (Delta 5) can reduce -- and in some cases stop -- HIV progression by triggering natural immunity.

This study, released online ahead of publication in the Journal of Virology, is the work of Professor Kelly MacDonald of medicine, senior author of the paper and a microbiologist at Mount Sinai Hospital. The research findings extend MacDonald's earlier studies of cellular immune function and its role in resisting HIV infection and disease in highly exposed populations in Canada and Kenya.

The study looked at two vaccine candidates: Delta 5 and Delta 6 simian imunodeficiency virus (SIV). Both were super-attenuated vaccines (a weakened form of the HIV virus used in primates with only the main structural proteins remaining). Delta 5, the stronger version of the two, was found to provide more protection against HIV. The vaccines were developed in conjunction with Dr. Mark Wainberg at McGill University.

"Using these super-attenuated viruses as vaccines in a primate model gives us an ideal opportunity to see how natural immunity to HIV can develop," MacDonald said.

The study demonstrated that control of and protection from HIV was dependent on initial exposure to the Delta 5 vaccine, which primed immune responses to the virus. This is similar to the Canadian and

Kenyan human subjects in MacDonald's previous study who were highly exposed to HIV, yet uninfected by the virus because their immune systems were primed by a weakened form of the HIV virus.

It is known that the HIV virus first enters the genital tract, then the genital lymph nodes and finally goes to the lymph nodes in the gut. The study indicated that the HIV virus needs to be controlled before it enters the lymph nodes in the gut. This is because 70 per cent of the body's immune system is found in the digestive tract and the memory of the immune system resides there. If the HIV virus reaches this area, it will knock out the immune memory and leave the person unable to fight the virus.

"We think that this is the right vaccine approach. Now, we need to test a practical vaccine delivery system that will intermittingly tickle the immune system to ensure the natural immunity is properly primed so if HIV exposure does occur, the system can respond quickly when it enters the body and before it reaches the lymph nodes in the gut."

As the next step, MacDonald and her team have adapted Varicella virus (chicken pox) vaccine into a delivery system for an HIV vaccine. Live-attenuated Varicella is a licensed vaccine with a 20-year safety record that provides the body long-term protection through silent reactivation of the chicken pox virus intermittently, which triggers the immune system. MacDonald and her team have inserted HIV genes into the live-attenuated Varicella virus to create a vaccine that is non-toxic and incapable of causing disease. This vaccine will undergo a trial this spring with the hope that it will generate immunity to both chicken pox and HIV.

"The most effective way to get ahead of HIV worldwide is to develop a vaccine. That's our end goal," MacDonald said.

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Provided by University of Toronto

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