Penile foreskin is immunologically complete: raises new vaccine possibilities for HIV vaccine

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Rhesus macaque monkeys infected with simian immunodeficiency virus (SIV) harbor immunoglobulin G (IgG) and SIV-specific antibodies and T cells in the foreskin of the penis, according to a study in the July 2012 *Journal of Virology*. This is the first time antibody secreting cells, antiviral antibodies or antiviral T cells have been reported in the foreskin of any primate.

Although "it has been known for some time that there was a population of immune cells in the surfaces of the human penis, and in all skin, for that matter, the potential functions of these cells, especially with regard to anti-HIV activity, had never been determined," says principal investigator Christopher J. Miller of the University of California, Davis. The new finding, he says, could lead to vaccine strategies designed to elicit HIV-specific immunity in the foreskin.

Cells which are targets of HIV are present in multiple epithelial tissues of the penis, and the foreskin-the skin of the penis that is lost during circumcision-is thought to be an especially important route of HIV transmission. "…the presence of an intact foreskin is associated with an approximately 50 percent increased risk of HIV acquisition," the researchers write, citing seven studies. Although HIV-specific antibodies and T cells are present in semen of HIV-infected humans, very little research has investigated mucosal immune responses of the surface of the penis, says Miller.

Male rhesus macaques are good models for the human reproductive system immunity. "…based on histology, there is no difference in the numbers or locations of CD4+ cells in the inner and outer foreskin of adult [rhesus macaques] or men," according to the report. "In addition to CD4+ T cells, the foreskin and glans of the human penis have a complete population of immune cells, but antigen-specific immune responses in these tissues have not been described [until now]," says Miller.

Miller's lab was also the first to report antiviral T cells in the female genital tract, research which led to efforts to develop vaccines that could elicit anti-HIV immunity in the female reproductive tract.

More information: K. Rothaeusler, Z.-M. Ma, H. Qureshi, T.D. Carroll, T. Rourke, M.B. McChesney, and C.J. Miller, 2012. Antiviral antibodies and T cells are present in the foreskin of simian immunodeficiency virus-infected rhesus macaques. *Journal of Virology* 86:7098-7106.

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