## REACH Research Alliance to Combat HIV/AIDS

### HIV/AIDS prevention news stories

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<th>Kwara Begins Debate on Aids Agency from allafrica.com</th>
<th>Volume 1, Issue 23 August 11-17, 2009</th>
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<td>Ilorin — Kwara State House of Assembly has begun debate on the bill of proposed Kwara State AIDS Control Agency (KWASACA). This followed a motion moved for the bill by the House Majority Leader, Alhaji Ishola Fulani and seconded by the Chairman, House Committee on Health, Hon. Bisi Olorun. The Speaker, Alhaji Abdul'Azeez Mohammed, who assured that the bill would soon be passed into law, explained that it is important to reduce prevalence of HIV and AIDS, an aim which he said the proposed agency will achieve. The passage of the bill into law will afford Kwara State the opportunity of tackling HIV/AIDS by taking radical steps and possibly attracting more financial support from international organizations,” the speaker said.</td>
<td>REACH Senior Principal Researcher, Prof L. Erinosho, and Principal Investigator, Prof R. Joseph</td>
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### An HIV-Blocking Gel for Women from [http://www.unews.utah.edu](http://www.unews.utah.edu)

Aug. 10, 2009 - University of Utah scientists developed a new kind of "molecular condom" to protect women from AIDS in Africa and other impoverished areas. Before sex, women would insert a vaginal gel that turns semisolid in the presence of semen, trapping AIDS virus particles in a microscopic mesh so they can't infect vaginal cells.

"The first step in the complicated process of HIV (human immunodeficiency virus) infection in a woman is the virus diffusing from semen to vaginal tissue. We want to stop that first step," says Patrick Kiser, an associate professor of bioengineering at the University of Utah’s College of Engineering. "We have created the first vaginal gel designed to prevent movement of the AIDS virus. This is unique. There’s nothing like it."

"We did it to develop technologies that can enable women to protect themselves against HIV without approval of their partner,” he adds. "This is important - particularly in resource-poor areas of the world like sub-Sahara Africa and south Asia where, in some age groups, as many as 60 percent of women already are infected with HIV. In these places, women often are not empowered to force their partners to wear a condom."

A study testing the behavior of the new gel and showing how it traps AIDS-causing HIV particles will be published online later this week in the journal Advanced Functional Materials. Kiser is the senior author.

"Due to cultural and socioeconomic factors, women often are unable to negotiate the use of protection with their partner," says Julie Jay, the study's first author and a University of Utah doctoral candidate in pharmaceutics and pharmaceutical chemistry.

So the researchers developed a vaginal gel that a woman could insert a few hours before sex and "could detect the presence of semen and provide a protective barrier between the vaginal tissue and HIV,” Jay says. "We wanted to build a gel that would stop HIV from interacting with vaginal tissue.”

Kiser estimates that if all goes well, human tests of the gel would start in three to five years, and the gel would reach the market in several more years. He and Jay want to incorporate an antiviral drug into the gel so it both blocks HIV movement and prevents the virus from replicating.

### A Rocky Road to Microbicides against AIDS

The effort to develop microbicides - intravaginal gels, rings and films - to prevent transmission of the AIDS virus has been halting. The few that have reached human clinical trials in Africa failed to prevent HIV transmission - either because they carried antiviral drugs that were not long-lived or strong enough, or because patients failed to use them. Some experimental microbicides increased the risk, possibly by irritating vaginal tissue and attracting immune cells that are targeted by the virus.
In 2006, Kiser and colleagues published a study on their development of another "molecular condom" to be applied vaginally as a liquid, turn into a gel coating at body temperature, then, in the presence of semen, turn liquid and release an anti-HIV drug.

Unfortunately, few antiviral drugs bind to and attack HIV in semen. And in Africa, high air temperatures prevent the gel from turning liquid so it could coat the vagina evenly, Kiser says.

The new "molecular condom" gel in the current study works in the opposite way. Like the old version, it changes in response to changes in pH - acidity or alkalinity - in the vagina caused by the introduction of semen during sex. But unlike the old gel, which became liquid at the higher (less acidic) pH of semen, the new "molecular condom" becomes a semisolid at the pH of semen, forming a mesh of "crosslinked" molecules.

The new gel is applied as a gel, and then becomes more solid and impenetrable as changes in pH alter the strength of the bond between the gel's two key components, both of which are polymers, or long, chain-like molecules made of many smaller, repeating units: PBA, or phenylboronic acid, and SHA, or salicylhydroxamic acid.

### Slowing and Blocking the AIDS Virus

Kiser’s team first published a study about the invention of the polymers and their behavior in 2007. A patent is pending on the invention.

The chemical bonds between the two polymers constantly attach and detach at normal, acidic vaginal pHs of about 4.8, allowing the gel to flow, Kiser says. But at a pH of 7.6 - the slightly alkaline condition when semen enters the vagina - the PBA and SHA polymers “crosslink” and stick tightly together, he adds. Part of the new study characterized the flow of the gel.

"It flows at a vaginal pH, and the flow becomes slower and slower as pH increases, and it begins to act more solid at the pH of semen," Jay says. HIV moves slowly within the gel, even when the gel is at lower pHs (higher acidity) and still flowing, but the virus is blocked at higher pHs caused by the entry of semen into the vagina.

The crosslinked polymers form a mesh that is smaller than microscopic, and instead is nanoscopic - on the scale of atoms and molecules - with a mesh size of a mere 30 to 50 nanometers - or 30 to 50 billionths of a meter. (A meter is about 39 inches.)

By comparison, an HIV particle is about 100 nanometers wide, sperm measure about 5 to 10 microns (5,000 to 10,000 nanometers) in cross section, and the width of a human hair is roughly 100 microns (100,000 nanometers).

Kiser says the gel should block other viruses and sperm, thus could work as a contraceptive and possibly prevent infection by herpes viruses and human papillomavirus (HPV), a major cause of cervical cancer.

The gel also could help prevent AIDS by blocking movement of immune system cells that try to combat infectious agents but instead get hijacked by the AIDS virus.

During the study, coauthors from Northwestern University in Chicago used a sophisticated microscope to track how fast HIV particles marked with fluorescent dye moved when they were caught in the gel, and how the speed varied with changes in pH.

The researchers compared movement of HIV particles with latex particles, which revealed that under somewhat acidic conditions, the HIV particles are slowed down in part because their surfaces react chemically with the polymers.

By adding an anti-AIDS drug such as tenofovir to the gel, "the virus would have two barriers to get through: the polymer barrier and then the drug barrier," Kiser says. Unlike an antiviral used with the old gel, tenofovir would not attack HIV directly, but protect immune cells in the vagina from infection.

Kiser says that after sex, the vagina gradually becomes acidic again, and any residual HIV particles would be inactivated both by acidity and an antiviral drug within the remaining gel, which still impedes HIV to some extent at normal vaginal acidity.

Kiser and Jay conducted the study with four other University of Utah researchers: bioengineering undergraduates Kristofer Langheinrich and Melissa Hanson, bioengineering graduate student Todd Johnson, and bioengineering researcher Meredith Clark. Other coauthors were from the Department of Cell and Molecular Biology at Northwestern University Medical School in Chicago: Thomas Hope, Shetha Shukair and Gianguido Cianci.

The study was funded by National Institutes of Health. Kiser’s research team is continuing the effort to develop microbicides to prevent AIDS thanks to a $100,000 grant from the Bill and Melinda Gates Foundation.

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Upcoming work includes assessing the HIV-prevention potential of other polymers, testing the safety of the new gel on vaginal cells, and studying how well the new gel blocks the transport of HIV into samples of human vaginal and penile tissue from hysterectomies and circumcisions, respectively.

To access the article online, go to http://www.unews.utah.edu/p/?r=062909-2

Uganda: TASO Uses MDD to Educate Masses

Kampala — THE AIDS Support Organisation (TASO) and other stakeholders have been asked to use music, drama and dance to transmit the correct messages about HIV/AIDS in order to reduce the rate of infection among adolescents and change the attitude of those living with HIV from deliberately infecting others.

The resident district commissioner (RDC) of Amuru, Edwin Komakech, challenged the HIV/AIDS development partners to extend the music, dance and drama to the villages especially those who were living in internally displaced peoples camps. He was closing a two-day TASO music, drama and dance festival with "scaling up HIV prevention among adolescents" as the theme at Opit Travellers' Inn in Gulu recently.

"Change the attitude of those living with HIV/AIDS who believe in infecting those who are HIV-negative," said Komakech.

He asked TASO to open up centres in each district.

The vice chairman of TASO board of trustees, Rev. Willy Olango, said the care for HIV/AIDS infected persons had risen to 50%.

"The best way of fighting the disease is through prevention and not treatment," said Olango, adding that TASO alone had 240,000 HIV/AIDS clients who need care and support.

The TASO regional manager, Henry Muzoora said treatment of HIV/AIDS is not sustainable.

"Antiretroviral drugs reduce the viral load and the CD4 count goes up, but this is not sustainable because drugs are expensive and have side effects," said Muzoora.

Muzoora added that out of every 140,000 Ugandans who catch HIV/AIDS, only 120,000 get drugs annually.

He added, "It is easy for adolescents to catch HIV because of economic pressure. The young people can be lured with gifts by adults for sex."

Muzoora appealed to parents to give their children all the basic needs like shoes, watches, phones and bags among others. Gulu, Masindi, Lira, Kitgum and Arua TASO centres participated in the music festival.

TASO deputy director of advocacy and networking, Joshua Wamboga, said there was need to scale up prevention of HIV/AIDS among married couples.

The function which was attended by several people including students and various districts saw TASO Gulu emerge winners of the event with 580 marks, followed by Masindi with 579, Lira with 551, Arua 508 and Kitgum trailing with 498 marks.

On top of voluntary counselling and testing, certificates were awarded to the respective TASO centres and some individuals who excelled.

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REACH is a collaborative program of Northwestern University and the University of Ibadan with the support of the Bill & Melinda Gates Foundation. REACH aims to improve HIV/AIDS prevention strategies in Nigeria through social science and community-based research.