

UIC faculty provide research, education to combat HIV/AIDS

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More than 1 million people in the United States are living with human immunosuppressive virus (HIV), and at least 40,000 will be infected this year. Around the world, more than 40 million are infected. Perhaps even more alarming is that, according to the Centers for Disease Control and Prevention (CDC), a growing number of women are contracting HIV. Of new cases among females, 76% are classified as via heterosexual transmission. Currently, condoms are the only product available to protect against transmission of HIV and other sexually transmitted diseases.



Staff at the Community Work and Life Center in Addis Ababa provide job readiness skills and HIV information.



Lin Tao, DDS, (right) in his UIC research lab with fellow faculty member Milton Engel, DDS.

“Condoms are controlled by men,” said Lin Tao, DDS, associate professor of oral biology at the University of Illinois at Chicago (UIC) College of Dentistry. “A woman has to negotiate [about condom use] and is often unsuccessful.” Tao is principal investigator among a team of researchers at UIC and Rush University working to develop a natural product for protecting women from sexual transmission of HIV and HSV (herpes simplex virus). Such a product would enable women, particularly those in poverty and from developing countries, to take charge of their sexual health.

The National Institutes of Health awarded Tao’s research team a \$2.6 million, five-year grant in July 2005 to test his concept. The team includes, from UIC, Mike Caffrey, PhD, associate professor, Department of Biochemistry and Molecular Genetics, and Deepak Shukla, PhD, assistant professor, Department of Ophthalmology and Visual Science, and from Rush University, Greg Spear.

Tao explained this product—a microbicide in gel, cream, or suppository form— could be administered vaginally, like a spermicide, before a woman had sex with a partner. Such live microbicide cultures can colonize, meaning it may not be necessary to use each time a woman has intercourse. “If we can inoculate this good microorganism, it can protect women with repeated use,” he said. “The novelty of Dr. Tao’s research is that instead of drug or antibody use he’s using a living organism”—lactobacilli, that is, ‘friendly’

bacteria—”to do the same thing,” said Caffrey. He explained there are two ways “envelope proteins” bind to cells, first by binding to the outside of the cell to inhibit entry, which is what Tao is researching, and second by other interactions that take place upon entry into a cell. Tao explained that decay-causing bacteria survive on a tooth by capturing the sugar from our diets. Similarly, the HIV virus is covered in a sugar-rich glycoprotein envelope.

The solution, he said, is finding bacteria that can capture the sugar by binding to the sugar coating. The lactobacilli are sugar-dependent. “By studying the interaction between probiotic bacteria and infectious disease,” Tao said, “we test the ability to capture HIV and herpes, and they [the bacteria] capture it on the surface.” Such lactobacilli have been used by people since the discovery that sour milk makes cheese.

According to the publication *European Molecular Biology Organization Reports* (Vol. 5, No. 8, 2004), “The lactobacilli identified by Tao have an unexpected affinity for the sugar mannose, which is present in the polysaccharides of the HIV viral envelope. By blocking the mannose (the most common sugar protein, Tao said) this specific strain of lactobacillus hinders the spread of the virus, as it is no longer able to bind to the cell surface receptors that trigger its entry into human cells.”

Now in stage one of what the U.S. Food and Drug Administration classifies as a three-stage process, Tao said he hopes in three years to have successfully tested on animals. Then phase two, he explained, would involve testing on a small number of human volunteers, usually no more than 30 and as few as three or five. The third stage is production.

As for the marketplace, the product, which will be inexpensive to produce, will not make money, Tao said, as it is designed for poor women. The primary advantage is that it would benefit women across the globe where poor access to healthcare makes treatment and prevention a challenge. “We know race isn’t a factor for getting HIV,” said Jennifer Ruth, spokesperson with the CDC, “but the realities of people’s lives may put them at a greater risk of HIV.”

In the United States, 47% of people estimated to be living with HIV are Black, 34% White, and 17% Hispanic. Worldwide, according to the World Health Organization, women bear a disproportionate burden of poverty and ill health, putting them at greater risk of infection.

In Ethiopia, two million cases have been reported, and women account for more than half the cases. According to Alice Johnson Butterfield, professor at the Jane Addams College of Social Work at UIC, the majority of HIV cases in Ethiopia are transmitted from men to their wives because of prostitution. “A big problem is the number of kids orphaned,” she said.



Alice Johnson Butterfield, professor at the Jane Addams College of Social Work at UIC, led a team to Ethiopia to give a workshop on educating that country’s workforce, a key component in the fight against HIV/AIDS.

“The poorest of the poor are taking in these orphans. That system is getting overwhelmed.” Johnson said it is not unusual for grandparents to be raising six or seven grandchildren. Johnson has been a key player in the university-to-university alliance established in 2001 between UIC and Addis Ababa (the capital of Ethiopia) University (AAU) through the Social Work Education in Ethiopia Partnership.

She has made ten trips to Ethiopia since then. Through the alliance, the first ever master’s program in social work was offered at AAU in 2004. Thirty-nine students entered the program last academic year, and 42 in July. Johnson helped conceptualize and write a grant that garnered \$100,000 from the U.S. State Department to establish a training center at AAU. The center’s partners are UIC, AAU, the Council of International Programs USA, African AIDS Initiative International Inc. (AIII), Christian Relief and Development Association (CRDA, a non-sectarian umbrella organization of nonprofit organizations), and the Ethiopian Employers’ Federation (EEF).

The Community Work and Life Center, which opened its doors in January, has a two-fold mission. One part consists of providing job readiness skills through workshops on resume and cover letter writing, interviewing skills, and career development through on and off-campus jobs and internship opportunities, and the other part involves educating the undergraduates about HIV/AIDS and its effects on the workplace. Although career centers are commonplace at U.S. colleges and universities, they were nonexistent in Ethiopia until now.

“The appearance of the new economic system in the Ethiopian market has incurred the need for an educated workforce,” Mulugeta Naizghi, dean of students at AAU, told attendees at the start of a three-day workshop. “Addis Ababa University, as a leading higher education institution, is expected to fill this demand.” The workshop was part of the exchange between AAU and UIC. In summer 2005, Naizghi was one of eight key leaders who came to UIC to serve as the technical advisory group; also attending were professors and representatives of the AIII, CRDA, and EEF. “With the eight who came here and 50 to 60 more,” said Johnson, “we’re concentrating on the leadership.”

Among the obstacles to upgrading Ethiopia’s workforce are a lack of adequate skilled workers, brain drain, corruption, and the ever-increasing devastating effects of HIV/AIDS, AAU reported. “We are now in a time where HIV/AIDS has affected more than 40 million people throughout the world, most of which are in Sub-Saharan Africa where Ethiopia is located,” said Naizghi. “In particular, college students are at a higher risk since they are at a stage where they leave home, they are planning for the future, they are gaining independence, and they are meeting lots of new people. In addition this group is at a point of physical, emotional, and sexual growth. And college life offers more opportunities to develop sexual relationships.

The bottom line is thus: we cannot afford to develop skilled manpower only to lose it to HIV/AIDS, can we?” Through the center’s workshops on HIV/AIDS, Johnson said, AAU graduates would be able to do advocacy work and educate others in the workplace about

prevention as well as take care of themselves. For the school and center to be sustainable, Johnson said, the next goal is starting a PhD program in social work to build faculty. She hopes to complete a grant application for the World Bank's initiative for innovation in education to obtain further funding. She also said the center plans for continued sustainability through funds from existing AAU departments. If all goes as planned, Johnson expects AAU's first PhD graduates to be awarded their degrees in three years.