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## Teaming with Technology to Fight TB and HIV

*Tuberculosis and HIV are both high-profile global health scourges, but surprisingly little focus has been paid on treating them when they team up.*

By David Richardson

Tuberculosis — already infecting the global population about one new case a second — is considered one of the most dangerous opportunistic infections attacking people with HIV.

The STOP TB Partnership reports that TB is the leading cause of death among persons infected with HIV in Africa. Worldwide, 1 in 4 TB deaths is HIV-related.

While the calculus seems straightforward — get HIV, see your immune system falter, then get TB — the tangled tango between the two deadly diseases is more complex.

According to the U.S. National Institutes of Health Division of Acquired Immunodeficiency Syndrome, the presence of TB accelerates the progression of HIV into AIDS, while HIV increases the chances of getting TB.

And treatment? While the World Health Organization estimates that one-third of the global population may currently have the bacterium that causes tuberculosis, the treatment — a yearlong regimen of drugs developed more than four decades ago — can, in the absence of HIV, usually restore health. But those who have both diseases face a much more difficult situation.

Despite the way they seem to gravitate toward one another, the pathways to treating the two diseases are very different. For example, says Dr. Gene Morse, associate dean of clinical pharmacology at the University of Buffalo, “TB can be targeted with an acute treatment period to get the bacteria to stop growing,” which is followed by less intensive therapy during a slower growth phase, and “if treatment is successful, we can stop the drugs.”

“HIV on the other hand, requires lifelong treatment that includes dealing with chronic inflammatory states and other conditions.”

Complicating matters, “the HIV treatment can have a direct effect on how well the TB treatment will work,” Morse says, citing research that shows Rifampin, a first-line TB therapy, can reduce effectiveness of antiretroviral drugs that suppress HIV’s advance.

Some experts have recommended patients delay antiretroviral treatments until they have been treated for TB — a trade-off that means patients increase the risk of their HIV progressing to AIDS during this uncontrolled interim. And, according to a source at the Health Division of Acquired Immunodeficiency Syndrome, the possibility of inadequate treatment of the persistent and adaptive pathogens of both diseases can become “the perfect setup for developing resistant TB that can spread to the rest of the community.”

So researchers are examining the means to treat the two diseases together, rather than separately.

“You can’t bring a lot of people who have TB into a clinic where you have people in the waiting room who have HIV and don’t have TB,”



*The presence of Tuberculosis accelerates the progression of HIV into AIDS, while HIV increases the chances of getting Tuberculosis.*

*(JoeBiafore/istockphoto)*

he explains. This is especially true when doing research in low-resource settings that lack sophisticated medical facilities.

With decades of experience in HIV drug development, Morse says now is the time to “synergize our energies and knowledge with HIV and TB” through better collaboration between the HIV and TB research communities. He recommends leveraging advanced information technology to coordinate TB and HIV clinical research programs worldwide, maximizing program efficacy and minimizing adverse drug interactions.

Today’s electronic data collection technology makes it possible to track lots of health parameters for individual patients, and Morse says with the addition of links between health systems and academia to provide real-time feedback into the research process, “the idea of fast-track development can be accelerated through health information technology.”

But technology is not the last word. He envisions a patient centered “Global HIV-TB Wellness and Research Initiative,” so named to inspire patients to “feel positive” about the approach.

Such a system will require harmonization of institutional review board procedures to assure ethical patient protections regardless of where participants are treated. Morse says it is important also to involve ministries of health and local leadership and stakeholders from the affected countries throughout the research process. And success will further require broad-based technology transfer and training, to assure the highest quality care for the patients and data for the research.

Addressing a TB/HIV dual disease research initiative, “The major barrier is money,” says George Atkinson, the CEO of Institute on Science for Global Policy and former science adviser to former U.S. State Department officials Colin Powell and Condoleezza Rice. He says that in donor countries, such as the United States, TB/HIV co-infection is not widely considered a major public health crisis.

“It’s a question of convincing people that these are opportunities that will protect their families much better than they are today,” Atkinson says. The bottom line, he adds, is this is a case that scientists will have to make directly with policymakers.

But Morse says that in addition to protecting lives, the prospect of examining TB and HIV in a coordinated fashion offers an additional opportunity.

“The nature of these two diseases is such that we can gain a lot of knowledge from looking at how these diseases are treated long term.” And that aggregate knowledge, he says, can be applied to treating other “complex long term medical conditions and these may include vexing public health concerns such as cancer and cardiovascular illnesses.”