

A deadly cycle of infection

Study by PHS, Clinical Research divisions shows malaria may fuel spread of HIV while HIV may boost adult malaria-infection rates in Africa

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Dr. Laith Abu-Raddad (left), of the PHS Division's Statistical Center for HIV/AIDS Research and Prevention, and Dr. James Kublin, an HIV/AIDS scientist in the Clinical Research Division, provided the first quantitative assessment of the impact of malaria on HIV and vice versa.

Photo by Stephanie Cartier

Malaria may be fueling the spread of HIV in areas of sub-Saharan Africa where there is a substantial overlap between the two diseases, while HIV may be playing a role in boosting adult malaria-infection rates in some parts of the region, according to a new study.

Co-authored by the Center's Drs. Laith Abu-Raddad and James Kublin, and Dr. Padmaja Patnaik of the School of Public Health at the University of North Carolina at Chapel Hill, and published in the Dec. 8 issue of *Science*, the study found that because malaria increases the viral load of an HIV-infected person on the order of 10 times, it makes HIV more transmissible to a sex partner. Conversely, HIV may play a role in the geographic expansion of malaria in Africa.

HIV, malaria co-infection

"While HIV/AIDS is predominantly spreading through sexual intercourse, this biological co-factor induced by malaria has contributed considerably to the spread of HIV by increasing HIV transmission probability per sexual act," said Abu-Raddad, an HIV/AIDS research scientist in the Public Health Sciences Division's Statistical Center for HIV/AIDS Research and Prevention, and the Center for Studies in Demography and Ecology at the University of Washington.

"In turn, the weakening of the immune system by HIV infection has fueled a rise in adult malaria-infection rates and may have facilitated the expansion of malaria in Africa," said Kublin, an HIV/AIDS scientist in the Clinical Research Division.

Grim statistics

Using a mathematical model designed by Abu-Raddad that was based on HIV and malaria co-infection data measured and collected by Kublin in Malawi, the scientists for the first time were able to assess quantitatively the impact of malaria on HIV and vice versa as well as provide the first assessment of the role of "blips" in HIV viral load seen during HIV co-infection with some other diseases. They estimate that tens of thousands of HIV infections and millions of malaria cases are likely the result of this co-infection. Using the town of Kisumu, Kenya, on the shore of Lake Victoria as an example, Abu-Raddad estimates that 5 percent of all HIV infections are attributed to the heightened HIV viral load induced by malaria. "In Kisumu, we estimate that 10 percent of adult malaria episodes are attributed to HIV," he said.

That translates into 8,500 excess HIV infections and 980,000 excess malaria episodes since 1980 in a town with an adult population of about 200,000, the researchers said.

Kublin said that these findings suggest that other co-infections such as genital herpes or tuberculosis may also have contributed to the rapid expansion of HIV in Africa.

The study's findings have implications for public health, Kublin said. "We can reduce HIV/AIDS transmission by concomitantly treating HIV/AIDS co-infections with malaria as well as other diseases," he said.

Dealing with the challenge

"The global public-health system's failure to deal with the challenge of HIV/AIDS contributes directly to its failure to tackle other public-health challenges such as malaria and tuberculosis," Abu-Raddad said. "As long as HIV/AIDS continues to spread, it will aggravate the difficulties we face with these other diseases and may contribute to the emergence of more lethal or drug-resistant strains of these infections," Kublin said.

The Center for AIDS Research at the University of Washington through the Mathematical Modeling Program for HIV/STD Research funded the study. The HIV Vaccine Trials Network at the Hutchinson Center provided partial support for this work.

TAGS: africa, Clinical Research, hiv, HIV AIDS, Jim Kublin, Public Health Sciences

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