calculated as the percentage of men who reported being in more than one sexual relationship at the time of the survey. This definition of concurrency attenuates the key result of the investigation—the number of sexual partners was assessed over a man's lifetime, but concurrency was the present point-prevalence in the community.

These limitations notwithstanding, the strong dose-effect of number of partners argues strongly for the importance of the number of lifetime male partners in driving the epidemic. Analyses of areas characterised by high numbers of lifetime male partners and little concurrency, and vice versa, also corroborate this finding.[5] Although regions with large numbers of partners and low concurrency were associated with high incidence of infection in women, no association between incidence and areas with high concurrency and low numbers of partners existed.[5]

Tanser and colleagues' report clearly contributes to the concurrency debate in substantial methodological ways, but even the investigators acknowledge that concurrency could have been an important driver at early stages of the epidemic. This debate should be put to rest. Concurrency is a subset of multiple partners: both contribute to sexual-network formation, and therefore both probably play a part in the epidemic's spread, even if they are not risk factors with the same effects at the same times in the same regions.

We agree with Tanser and colleagues that messages focusing on concurrency alone could diminish the importance of multiple partners, and so could be dangerous. Messages aimed at reductions in both multiple and concurrent partners might have diluted effects (as the researchers suggest), but this contention should be supported by empirical data about how target populations understand such messages—eg, the zero-grazing campaign in Uganda from 1986 to 1991 might have been an effective way to address both.[6]

Messages should be explicit about the behavioural change required and appropriate for the local context. Studies in Kenya[7] and Tanzania[8] suggest that many young people do not understand global catchphrases such as those about faithfulness, with interpretations ranging from the importance of trust in relationships to the value of being a good or honest person. Essentially, Tanser and colleagues' study reinforces the need for simple, unambiguous prevention messages to discourage individuals from having several sexual partners, whether concurrent or not.

*Nancy S Padian, Shanthi Manian
Office of the US Global AIDS Coordinator, US Department of State, Washington, DC, USA (NSP); Department of Epidemiology (NSP) and Institute of Business and Economic Research (SM), University of California, Berkeley, CA 94704, USA; and Bill & Melinda Gates Foundation, Seattle, WA, USA (NSP)
nancy.padian@gmail.com

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Test and treat in HIV: success could depend on rapid detection

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In *The Lancet*, Kimberly Powers and colleagues[1] present a mathematical model of HIV transmission to project the population-level effectiveness of three approaches to the provision of universal HIV testing and immediate initiation of antiretroviral therapy for HIV prevention (a test-and-treat intervention) in Lilongwe, Malawi. Antiretrovirals reduce infectiousness to others by reducing viral loads in the blood and genital secretions of patients with HIV.[2,3] This study follows closely on from the exciting results of HPTN-052,[4] the first phase 3 randomised trial of antiretroviral therapy to prevent HIV transmission in serodiscordant couples for whom the

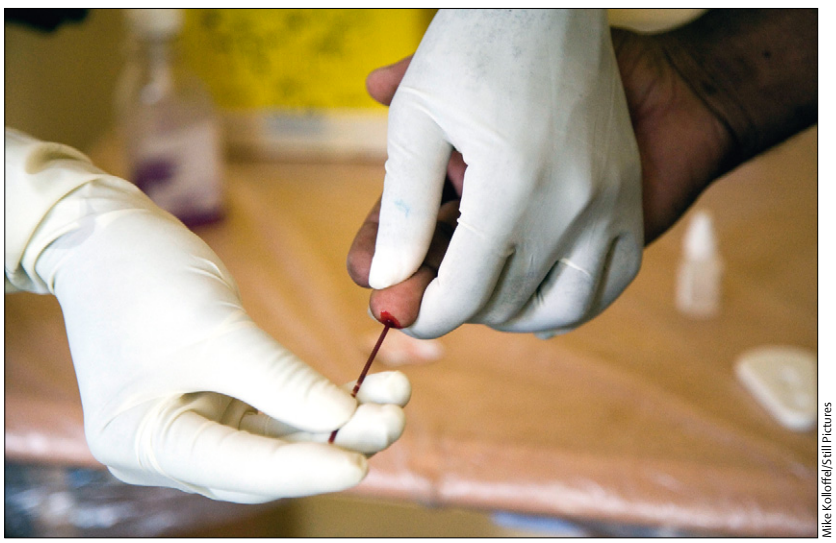
partner with HIV does not meet the criteria for starting antiretrovirals (CD4 cell count of 350–550 cells per μL). HPTN-052 received wide media coverage earlier this year when interim analysis showed 96% fewer HIV transmission events in couples who began treatment immediately than in couples who started at a later date (one *vs* 27 transmission events).

Powers and colleagues' study originates from the research group that spearheaded HPTN-052 and did pioneering work on the identification of acute HIV infection in Africa. Test-and-treat strategies have been assessed in several previous mathematical modelling studies.[5,6] Powers and colleagues' report stands out because of the unusually comprehensive data about sexual partnerships and viral loads from acute HIV cases, which allow consideration of differential per-contact transmissibility by disease stage and more precise estimation of the likely importance of early HIV infection for epidemic dynamics in the context of test and treat. Early HIV infection is potentially very important because this disease stage, although constituting only a brief period in the natural history of HIV (generally defined as about the first 6 months after infection), has a disproportionate effect on disease spread because it is characterised by a high viral load and thus a high per-contact transmission risk.[7,8]

Powers and colleagues estimate that nearly 40% of incident infections in Lilongwe result from early-stage HIV infections; this estimate is greater than that assumed by Granich and colleagues in a 2009 modelling study,[5] which concluded that universal yearly HIV testing of adults followed by immediate highly active antiretroviral therapy for individuals who test positive (ie, a test-and-treat strategy) could reduce HIV prevalence from 15% to less than 1% within the next 50 years. Conclusions from Powers and colleagues' study are less favourable, with the key finding being that if individuals within the first 6 months of their HIV infection are indeed responsible for a high proportion of all transmission events, a substantial proportion needs to be rapidly identified and treated during this stage to have any prospect of the large decreases in HIV prevalence projected by Granich and colleagues. The importance of early HIV in transmission is sensitive to epidemic stage and assumptions about the frequency of partner change and concurrent relationships, and will thus probably vary between populations.

This requirement of rapid detection of incident infection adds substantially to the already formidable logistical challenges and costs of attempting to implement test-and-treat strategies. HIV infection is still a stigmatising disease, making regular repeat HIV testing and counselling difficult to scale up. And antiretroviral therapy for prevention needs high levels of adherence for life. Economies of scale and differential pricing have resulted in very low unit costs for the widely used HIV testing and care commodities in resource-poor settings, but detection of early HIV infection would need more expensive kits that can detect antigen and antibodies, along with other changes to the HIV testing strategy.[9,10] Other concerns related to test-and-treat strategies include the risk of accelerating the emergence of antiviral resistance or risk compensation (ie, adoption of more risky sexual behaviours when an individual feels protected by treatment[11]) and the ethics of treating individuals to protect their contacts.[12]

Test-and-treat strategies are beginning to be investigated in community-wide cluster-randomised trials and demonstration projects, building on the impressive scale-up of HIV-care programmes in Africa during the past 5 years. Should these trials be modified to incorporate the need to better address early HIV infection? Of course this would be ideal, and investigators and implementers should be aware of this aspect of HIV epidemiology and aim to collect data in the most informative way possible, even if practicalities dictate against inclusion of specific components targeting this stage. Alternatively, combined HIV-prevention strategies could be used, because populations targeted for repeat testing could then be well placed to receive interventions aimed at HIV-negative



Mike Kollöffel/Still Pictures

participants as well. Such prevention strategies include male circumcision and pre-exposure prophylaxis with oral tablets or vaginal gels containing tenofovir.[13]

*Ted Cohen, Elizabeth L Corbett
Division of Global Health Equity, Brigham and Women's Hospital, and Center for Communicable Disease Dynamics and Department of Epidemiology, Harvard School of Public Health, Boston MA 02115, USA (TC); and Faculty of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, London, UK (ELC)
tcohen@hsph.harvard.edu

ELC has a pending grant application with the US National Institute of Health. TC declares that he has no conflicts of interest.

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Antiretrovirals for HIV prevention: translating promise into praxis

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The road between Vienna and Rome has been a historic thoroughfare for centuries, but in the past year the distance has symbolised the move from aspirations that antiretroviral drugs could decrease HIV incidence to a secure scientific foundation for an invigorated strategy of epidemic control. Findings from the CAPRISA 004 study,[1] presented at the Vienna International AIDS Conference in August, 2010, showed that a tenofovir-containing gel reduced HIV incidence by about 39% in uninfected women in South Africa. Subsequently, the iPrEx study[2] demonstrated that oral tenofovir-emtricitabine decreased HIV transmission by about 44% among men who have sex with men (MSM). In both studies, participants who were highly adherent derived the greatest prophylactic benefit. At this month's International AIDS Society meeting in Rome, announcement of results from the HPTN 052 study will show that people infected with HIV whose CD4 counts were 350 cells per µL or greater when they initiated treatment were 96% less likely to transmit HIV to uninfected spouses than those who started later.[3]

The past year has not only had unmitigated successes. The FEM-PrEP study[4] assessing oral tenofovir-emtricitabine pre-exposure prophylaxis (PrEP) in women in sub-Saharan African was prematurely terminated because the intervention did not appear to be efficacious. In *The Lancet*, a Viewpoint by Salim Abdool Karim and colleagues[5] could help to explain this surprising result, because protection in CAPRISA 004 was associated with vaginal tenofovir concentrations exceeding 1 ng/mL. Oral tenofovir has been shown to achieve vaginal tissue concentrations that are less than 1% of those observed after women applied the topical gel, so topical chemoprevention could trump oral tenofovir.[6,7] Another possible reason for the poor efficacy of the intervention in FEM-PrEP could be because of non-adherence, which attenuated the benefits seen in CAPRISA 004 and iPrEx, and is the Achilles heel of chemoprevention. Analyses that might inform either hypothesis are underway.

In the next few years additional understanding will come from studies of PrEP in injecting drug users and heterosexual discordant couples, and a comparison of