immune response is impaired, each booster may stimulate but not regenerate memory cells. The kinetics of PRP concentration and avidity, in our patients, support such a hypothesis.

It has been suggested that periodic Hib vaccine boosters could be necessary for the protection of HIV-1-infected patients [7]. Our data, in association with recent evidence that invasive Hib disease is uncommon among HIV-infected patients [11], do not support such a policy, especially for countries with good herd immunity as a result of their universal Hib immunization programmes.

Our findings that PRP-T has impaired immunological properties among HIV-11infected children highlight the need for a careful assessment of other conjugate vaccines, which have recently been recommended for HIV-1-infected children, e.g. pneumococcal conjugate vaccines. Immunological memory will offer critical information for the evaluation of vaccine efficacy, as well as the establishment of the optimal vaccination schedule for individuals at greatest risk.

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Tuberculosis active case-finding in a mother-to-child HIV transmission prevention programme in Soweto, South Africa

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HIV markedly increases the risk of tuberculosis. We implemented active tuberculosis case-finding in a prevention of mother-to-child transmission programme in South Africa. Of 438 tuberculin-tested HIV-infected patients, 49% had a reaction ⩾ 5 mm induration, 120 underwent further evaluation for active disease. The prevalence of active tuberculosis was 11%, a high rate of tuberculosis in this population, and underscores the need for tuberculosis active case-finding to prevent mortality and transmission, and preventive therapy for latent tuberculosis infection.

Recent reports have demonstrated a high maternal mortality rate associated with tuberculosis in HIV-infected patients in South Africa [1]. HIV-infected individuals with latent tuberculosis infection have up to a 10% annual risk of developing active tuberculosis, with increased mortality. Furthermore, tuberculosis preventive therapy has been shown to be effective in reducing the incidence of tuberculosis in HIV-infected, tuberculin skin test (TST)-positive individuals. Tuber-

culosis active case-finding and preventive therapy have been advocated as an essential strategy for the reduction of the incidence of tuberculosis in both developed and developing countries [2]. We report the prevalence of undiagnosed active tuberculosis in HIV-infected, TST-positive individuals attending a programme to prevent mother-to-child HIV transmission in Soweto, South Africa.

Patients were recruited at the Chris Hani Baragwanath Hospital Perinatal HIV Research Unit. All patients received pre and post-HIV voluntary counselling and testing (VCT) as part of the routine antenatal services. Tuberculosis screening was performed after delivery during the postnatal follow-up for HIV-infected women and their male partners. Two tuberculin units of purified protein derivative RT-23 were administered by the Mantoux method, and induration was measured after 2–3 days. If 5 mm or greater induration was present, the patient was referred to the study physician for a clinical evaluation. Patients had chest radiography, and those with symptoms suggestive of tuberculosis underwent detailed physical examination, fluorescence microscopy and BACTEC cultures on three sputum specimens, and other tests as indicated. 'Definite tuberculosis' was defined as a positive culture for *Mycobacterium tuberculosis* from any site. 'Probable tuberculosis' was defined as one or more positive acid fast smears from sputum or an extrapulmonary site without a positive culture, or typical pathological findings on a biopsy. 'Possible tuberculosis' included signs and symptoms consistent with tuberculosis, as well as the clinical response to therapy, but without a positive smear or culture. This evaluation was approved by the Ethical Review Committee of the University of the Witwatersrand, South Africa, and the Joint Committee on Clinical Investigation of the Johns Hopkins Medical Institutions, Baltimore, MD, USA.

From May to November 2001, 438 HIV-infected patients had skin tests performed. The mean age was 30 years (± 6) and over 95% were women. A total of 318 (73%) returned for results, with 157 of these (49%) having 5 mm or greater induration. Among individuals with a positive TST, 120 patients (76%) underwent complete tuberculosis screening, of whom 13 (11%) were found to have active tuberculosis (3% of the total population; Fig. 1). The median CD4 cell count among tuberculosis cases was 230 cells/mm^3 versus 508 cells/mm^3 for patients without tuberculosis ($P < 0.01$). Among the 13 patients with active tuberculosis, six had definite tuberculosis, including two with positive cultures from lymph node aspirates, three from sputum (one smear positive), and one from both sputum and urine. Five patients had probable tuberculosis with positive acid-fast bacillus (AFB) smears from lymph node aspirates (three), bone marrow aspirate (one) and bronchial washings (one). Two patients had possible tuberculosis, with symptoms and signs consistent with tuberculosis, as well as hilar adenopathy on chest X-ray (one) or pericardial effusion on echocardiogram (one) and clinical improvement with subsequent tuberculosis treatment. Therefore, nine out of 13 patients had extrapulmonary tuberculosis and four out of 13 had culture-positive pulmonary tuberculosis, including one patient with an AFB-positive smear.

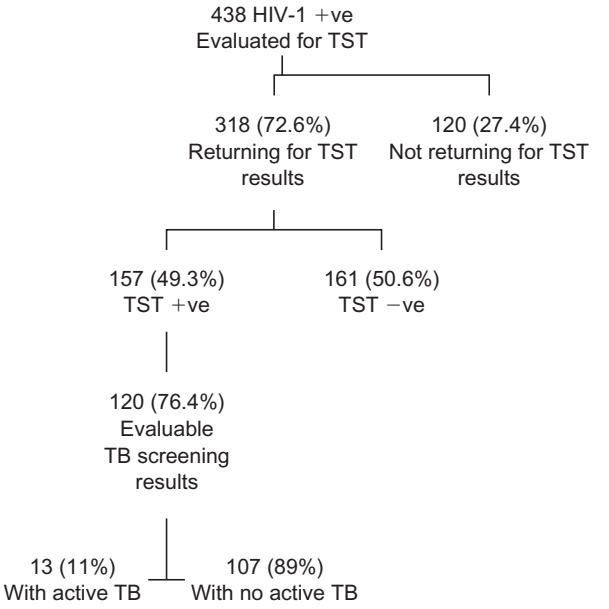

Fig. 1. Tuberculosis case-finding at Chris Hani Baragwanath Perinatal HIV Research Unit in Soweto, South Africa. TB, Tuberculosis; TST, tuberculin skin test.

Nearly 50% of our study sample of mostly women in a prevention of mother-to-child transmission programme had latent tuberculosis infection. More importantly, however, we found that 11% of the TST-positive HIV-infected individuals we examined had undiagnosed active tuberculosis. This is a minimal estimate, as TST-negative patients were not further evaluated. Individuals with active tuberculosis act as a reservoir that may contribute to ongoing transmission in the home and community. All of these individuals had a newborn, HIV-exposed infant at home to whom the transmission of *M. tuberculosis* could be devastating. The AFB smear identifies the most infectious tuberculosis patients; however, individuals with smear-negative, culture-positive tuberculosis may also serve as a significant source of community transmission of tuberculosis [3]. Our findings are in concordance with earlier reports [4] suggesting that active tuberculosis case-finding, as part of HIV counselling and testing, can have a substantial yield.

These findings suggest two possible courses of action. First, active tuberculosis case-finding should be consid-

ered whenever feasible in HIV-infected individuals living in high HIV and tuberculosis-endemic areas. Settings suitable for active case-finding are those where HIV-positive individuals are concentrated, such as healthcare facilities, VCT centres, HIV support organizations, and prisons. Second, HIV-infected individuals with latent tuberculosis infection should receive tuberculosis preventive therapy. The feasibility of tuberculosis preventive therapy in developing countries has been questioned because of operational difficulties; however, a recent operational assessment of isoniazid prophylaxis in a community VCT centre in Uganda [5] demonstrated that tuberculosis preventive therapy can be successfully implemented. Even as the treatment of HIV infection with antiretroviral drugs increases, tuberculosis preventive therapy will remain important. Antiretroviral therapy reduces the rate of tuberculosis substantially, but the incidence is still high, and many patients will develop tuberculosis before antiretroviral therapy is indicated [6]. The median CD4 cell count in our patients who had tuberculosis was 230 cells/mm^3, meaning that antiretroviral drugs would not have been offered even if they were available. Given the substantial benefits to HIV-infected patients of case-finding, proper treatment, and preventive therapy against tuberculosis, the development of innovative ways of integrating tuberculosis prevention and treatment services and HIV care should be a priority on the research agenda.

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Low prevalence of hepatitis C virus antibodies in HIV-endemic area of Zimbabwe support sexual transmission as the major route of HIV transmission in Africa

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Medical injections have recently been suggested to cause a large proportion of African HIV infections. If this hypothesis is true, high prevalences of other infections transmitted by injections should be expected. In a cohort of 145 HIV-negative and 124 HIV-positive individuals from a rural area of Zimbabwe with a high HIV prevalence we only found one with antibodies to hepatitis C virus. This does not support injections playing a major role in HIV transmission in sub-Saharan Africa.

The fast-growing HIV epidemic in sub-Saharan Africa has become a major threat to health and development on the continent. The general concept has been that the African HIV epidemic is driven by heterosexual spread, with mother-to-child transmission as the second most important transmission mechanism. This paradigm has recently been challenged in a series of papers authored by Gisselquist and colleagues [1–3] and Brewer *et al*. [4]. They suggested that medical injections have contributed far more to African HIV transmission than previously recognized [1–4]. The papers have received considerable interest [5], and their hypothesis has tremendous importance for the design of HIV preventative efforts in the developing world. If medical injections have been a major contributor to the African HIV epidemic, more effort needs to be placed on safe practices when providing medical injections. However, if medical injections have only had a minor effect on the dramatic spread of HIV, recent papers may risk disturbing or perhaps even derailing many of the well-designed preventative efforts focusing on the sexual spread of HIV. This could create very unfortunate repercussions for current programmes targeting the HIV/AIDS pandemic in the region.

Hepatitis C virus (HCV) has shown a remarkable capacity for spreading by unsafe injections. This includes large epidemics of HCV among intravenous drug users, in which more than half of the tested populations are often HCV seropositive in both devel-