

panded HIV counseling and testing and treatment for sexually transmitted diseases, broad communication of information on prevention, promotion of condom use, an increase in the proportion of blood donation that is voluntary (since payment for donation attracts high-risk donors), improved access to safe blood, and expansion of programs for preventing mother-to-child transmission.

Each year, about 28 million children are born in India. Skilled health care personnel attend less than half of all births; infant mortality is about 55 per 1000 live births. In 2004, only an estimated 4% of all pregnant women received HIV counseling and testing, and only about 2% of HIV-positive pregnant women received antiretroviral prophylaxis, usually consisting of a single peripartum dose of nevirapine. Moreover, HIV-positive pregnant women may benefit from antepartum combination antiretroviral treatment for their own health. Under NACP-III, more pregnant women should receive monitoring of their CD4 cell counts, antiretroviral treatment, regimens designed to prevent HIV transmission (including combinations of antiretroviral drugs), and other services.

In scaling up treatment, India's domestic pharmaceutical industry has a critical role. A paradox is that Indian companies have become major suppliers of low-cost generic antiretroviral medications to low- and middle-income countries in Africa and elsewhere at a time when there are still major unmet needs for HIV treatment in India. Cipla, a company based in Mumbai, manufactures the largest range of HIV drugs and has the largest market share. Cipla exports 18 times as much antiretroviral medication as it sells domestically, according to Amar Lulla, its

Tuberculosis and HIV in India

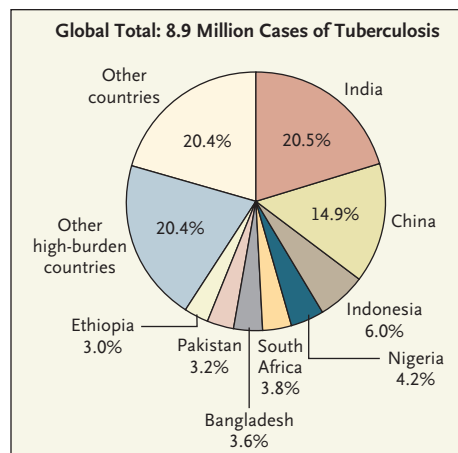
Tuberculosis is the most common HIV-related opportunistic infection in India, and caring for patients with both diseases is a major public health challenge. India has about 1.8 million new cases of tuberculosis annually, accounting for a fifth of new cases in the world — a greater number than in any other country (see pie chart).¹ Patients with latent *Mycobacterium tuberculosis* infection are at higher risk for progression if they are coinfecting with HIV. Patients with HIV infection have a similar bacteriologic response to tuberculosis treatment as those who are not infected but have higher risks of recurrence and death. The influence of tuberculosis coinfection on the progression of HIV disease is controversial.²

In 2004, about 330,000 people in India died from tuberculosis.¹ Two of every five persons — more than 400 million — have latent tuberculosis infection.³ Tuberculosis can be expected to develop

in more than half of those who are also infected with HIV. At present, however, only about 5% of new tuberculosis cases in India occur in people with HIV coinfection. The situation differs from that in sub-Saharan Africa, where the incidence of tuberculosis in many countries is higher than in India and as many as 80% of patients with tuberculosis are coinfecting with HIV. In Africa, HIV has reversed gains in tuberculosis control that were achieved a quarter-century ago.^{1,2} Such a reversal is unlikely to occur in India.⁴

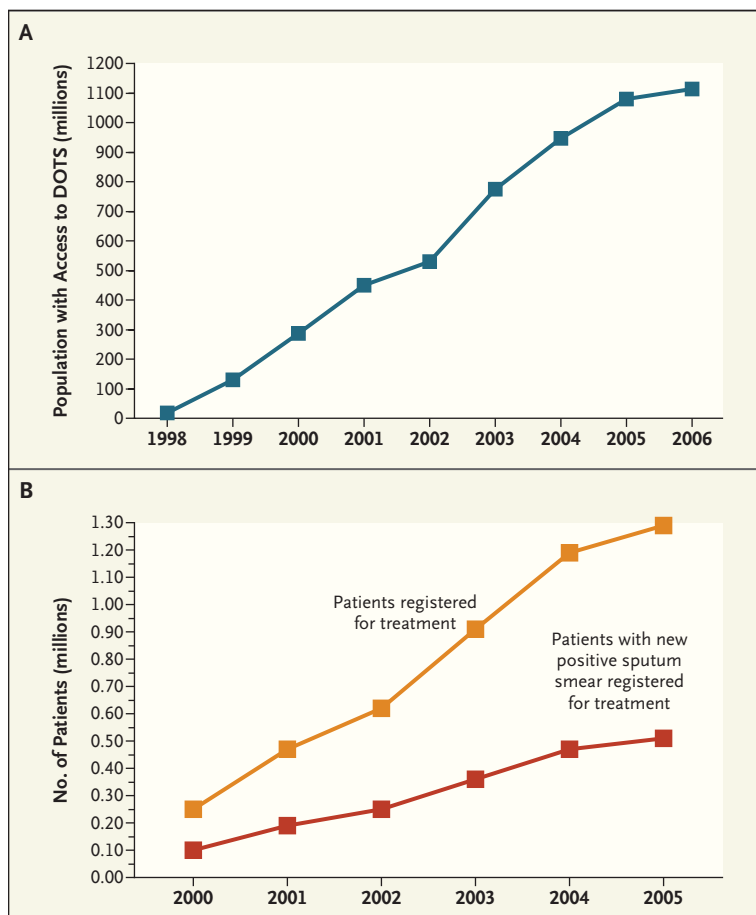
India began its Revised National Tuberculosis Control Program in 1993.⁵ Its mainstay is the strategy of directly observed treatment, short course (DOTS). Typically, during the initial 2 to 3 months of treatment, medication is administered three times a week under direct observation. During the subsequent 4 to 5 months, at least one of the three weekly administrations is directly supervised.³

After pilot testing, rapid expansion of DOTS began in the late 1990s, and in March 2006, India achieved nationwide coverage (see line graph). Each month, more than 100,000 Indian patients — about two fifths of them persons with a new positive sputum smear — begin treatment. The success rate of treatment — the percentage of new smear-positive patients who are cured (i.e., whose sputum smear is negative) plus the percentage who complete treatment without bacte-



Estimated Number of New Tuberculosis Cases, 2004.

Data are from the World Health Organization. The other high-burden countries, in descending order of number of cases, are the Philippines, Kenya, the Democratic Republic of Congo, Russia, Vietnam, Tanzania, Uganda, Brazil, Afghanistan, Thailand, Mozambique, Zimbabwe, Myanmar, and Cambodia.



Population with Access to DOTS, for Tuberculosis, and Patients Receiving DOTS.

Data are from the Revised National Tuberculosis Control Program, India.

riologic confirmation of cure — is about 86%.¹ In about 2% of patients, treatment fails; in 7% treatment is interrupted for 2 consecutive months or more; and 4% die despite treatment.³ The estimated incidence of multidrug-resistant tuberculosis is 2.4% among patients with new cases and 15% among those who have previously received treatment. In 2006, the national budget for treatment was \$57 million and the total cost of tuberculosis control was \$100 million.¹

India's national tuberculosis-control program provides care, diagnosis, and treatment on a huge scale^{3,5} — offering an example that the National AIDS Control Program

may be able to learn from as it expands. Of course, HIV treatment is often more complex and expensive than tuberculosis treatment and must continue indefinitely. When patients with HIV infection are treated at the same facility as those with tuberculosis, effective infection-control measures are essential, given the high risk of nosocomial transmission of tuberculosis. When caring for coinfecting patients, physicians must consider many clinical issues, such as those related to the prevention of disease; the timing of treatment; the choice of medications; drug interactions, side effects, and resistance; and potential reinfection with other mycobacterium strains. Antiretroviral therapy

is essential for reducing the number of deaths from tuberculosis that are related to HIV infection.⁴

In India, tuberculosis care and HIV care are increasingly being coordinated, but the full benefits have yet to be realized. An example of successful coordination is the referral of people with suspected tuberculosis from voluntary counseling and testing centers for HIV to tuberculosis-control facilities. Between January and September 2006, a total of 15,000 people with suspected tuberculosis who were HIV-positive and 16,420 who were HIV-negative were referred to such facilities by centers in the six Indian states with the highest HIV prevalence (Andhra Pradesh, Karnataka, Maharashtra, Manipur, Nagaland, and Tamil Nadu); tuberculosis was diagnosed in 22.3% and 23.9% of patients in these groups, respectively. DOTS was begun in many of these patients. The control of both tuberculosis and HIV is likely to be most successful if programs collaborate whenever possible and are closely integrated with the rest of medical care.²

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