The challenge is international
John Porter, Keith McAdam & Richard Feachem

Every year there are eight million new cases of tuberculosis and three million deaths. The disease accounts for 6.7% of all deaths in the developing world, 18.5% of all deaths in adults aged 15 to 59 years, and 26% of avoidable adult deaths. It is a disease which is curable and preventable, and treatment of TB is one of the most cost-effective health interventions available.

Despite these facts, tuberculosis has been comparatively neglected by the international health community over the past 20 years. An increase in the number of cases occurring in the industrialized world, the HIV–TB connection, and the spectre of multidrug resistance, has forced tuberculosis to the forefront of the international health agenda.

Now that tuberculosis is considered a health priority, what do we need to do to address this latest international public health challenge? The first step is to improve communication and encourage discussion and collaboration between the different organizations involved in tuberculosis research in order to determine how resources should be spent. These discussions need to transcend the barriers of our own particular research interests to include information and ideas from people working in other specialist fields. A multidisciplinary approach is required. It is through discussion and the exchange of ideas that progress and appropriate decisions will be made.

Among the organizations that can lighten the burden of the millions of people infected with TB are the country control programmes and the ministries of health that manage them, academic institutions, the pharmaceutical industry, international organizations, and the world political community, which must have the will to allocate the necessary resources to combat the disease.

"Back to the future"

To assist and encourage this dialogue among scientists in the different fields of TB, the London School of Hygiene and Tropical Medicine hosted a public health forum in April entitled "Tuberculosis – back to the future". This brought together specialists from 56 different countries, and included immunologists, epidemiologists, economists, clinicians, policy-makers, and directors of TB control programmes. The forum attempted to develop and integrate the perspectives of the different scientific disciplines in a climate which fostered discussion and exchange of views.

There is much that we know about tuberculosis. The plenary papers described the severity of the international problem and how the interaction between TB and HIV infection has resulted in increased difficulty with diagnosis and treatment. Cost-effectiveness analysis and the use of DALYs (disability-adjusted life years) have demonstrated the economic importance of the disease and the cost-effectiveness of treatment. Adherence to drug regimens is a major problem for control programmes: new drugs which
can be taken for shorter periods would undoubtedly improve adherence and reduce the problem of multidrug resistance. But many of the tools for dealing with TB have not been used appropriately and the present situation calls for new, innovative approaches.

There is also much that we do not know about this disease. We know little about immunity to TB or about the virulence of the organism. This knowledge would help us in developing improved diagnostic tools and vaccines, particularly since we have new molecular techniques to assist us.

The forum produced three messages: first, that there is an increasing international problem which has been made worse by the interaction between Mycobacterium tuberculosis and HIV infection as well as the emergence of multidrug resistance. Second, that research into new drugs, vaccines, diagnostics, and control programme strategy deserve a high priority. Third, that cost-effective methods for control are available but are being underapplied; we need to invest more in control methods which are already known and understood.

### Four control methods

The changes in TB epidemiology described during the forum have provided the international community with a new public health challenge. At present, there are four methods for controlling the disease: improvement in social and economic conditions, case-finding and treatment, chemoprophylaxis, and vaccination.

Social and economic development is the measure that has the most profound effect in reducing the disease load; in many countries, unfortunately, such development as a means of controlling the disease must be seen as a long-term solution. In the meantime other interventions must be employed. For national control programmes, the strategies are already available. The most important is to find and treat cases of tuberculosis, and to ensure that the patients adhere to their treatment. To achieve this, innovative methods which facilitate delivery of treatment are needed—education, supervised regimens, incentives, and encouragement and empowerment will all increase patient compliance.

Priorities within tuberculosis control should continue to be case-finding and treatment with short-course chemotherapy. If resources are available, chemoprophylaxis should be given to TB-infected persons at high risk of disease and is particularly indicated for children who are close contacts of infective TB cases and persons with HIV infection. BCG vaccination is needed to protect children against the severe forms of TB such as tuberculous meningitis. National control programmes need a rational and coherent drugs policy aimed at guaranteeing the availability of essential drugs.
Where poverty strikes, tuberculosis often does too.

A wide spectrum of TB-related activities are planned or under way in many countries. New surveillance systems are being developed for drug resistance in some countries, while others are concentrating on the problems of reactivation in persons with HIV infection by studying preventive treatment. In the field of compliance, some tuberculosis programmes are looking at education to improve compliance, others at supervised regimens and incentives, and still others at encouragement and empowerment. The education is being targeted at influential groups such as politicians, community leaders and groups at high risk of the disease.

For the laboratory research scientist, there is the challenge of using modern biotechnology to regenerate the scientific impetus and breadth of vision characteristic of TB research in the earlier part of this century, and of applying these advances to developing countries. If this can be done there is the chance of a new vaccine, of new methods for determining protective immunity and of using this information to reinforce the body’s natural ability to cope with infection. Research can help us to understand the virulence of the tubercle bacillus, and to develop new diagnostic tools and rapid tests for drug resistance.

**TB can be cured inexpensively**

- TB has a cure, and treatment is inexpensive.
- TB control is a very cost-effective health intervention. Its cost-effectiveness is equivalent to that of the well-known child­hood immunization programmes.
- Successful treatment requires 6–8 months of consistent, uninterrupted medication.
- Successful treatment demands education and follow-up.
- New, drug-resistant strains of TB are developing because patients are not completing their treatment. These drug-resistant strains are significantly more dangerous to the individual and the community because they are more difficult and more expensive to treat.
- The best way to prevent TB is to cure infectious cases in their early stages in order to prevent transmission to others.
- TB control programmes that treat infectious patients but don’t ensure that they are cured risk doing more harm than good. Patients who have incomplete treatment can develop — and spread — drug-resistant TB.
- The World Health Organization’s TB Programme is working with governments to develop effective control activities. With rigorous monitoring and evaluation procedures, these programmes will have a tremendous impact on the disease.

**Industrial partners**

The pharmaceutical and vaccine industry also has an important role. It needs to forge new partnerships with academic and international organizations, and to increase communication with countries where TB is common. Research needs to be directed at providing appropriate, inexpensive medications for control programmes worldwide. New drugs need to be developed which can destroy latent infection, and which require only days or weeks of therapy rather than months. Research will inevitably be conducted in areas of the world where TB is common. Funds need to be targeted at drugs which will provide treatment for the many rather than for the selected few in the industrialized world. International purchasing consortia may be required to give confidence to the private sector concerning the market for new drugs and vaccines, and thereby to stimulate the necessary investment in research and development.

The public health community has already managed to direct the attention of politicians to the increasing problem of TB, but there continues to be a need for better dialogue between the health community and the political community. Politicians need to be reminded of the association between the disease and poverty, and of the continued need to target energy and funds at the poorer areas of the world where TB is found.

The energy and enthusiasm are there among the multidisciplinary groups of health care workers and scientists working on tuberculosis. Politicians can harness this energy and enthusiasm by providing resources to support control programmes as well as funds to answer both operational and basic scientific research questions. Most essential are communication and cooperation between public health practitioners, scientists, the pharmaceutical industry and politicians, aimed at developing a cohesive strategy to deal with this international public health challenge.