

Conclusions

“If preventable, why not prevented?” This question was posed by King Edward VII when visiting a tuberculosis sanatorium several decades before the discovery of anti-tuberculosis drugs. It is a question that should rightly challenge the conscience of the world community today. Tuberculosis is among the most effective and cost effective of all diseases to treat yet it has been declared a global emergency. Clearly something is radically wrong with either the available therapy, the way in which it is administered or, more likely, the extent of interest, care, compassion and altruism shown by the wealthier nations — in which a mere 5% of cases of tuberculosis and 2% of deaths due to it occur — to those where the greatest burden of the disease falls. It is tempting for those in the industrialised countries to say ‘tuberculosis is not our problem’, but if potentially untreatable multidrug resistant forms of the disease continue to spread, and if HIV-related tuberculosis devastates the economies of the developing world, the global community will learn too late that it is everyone’s problem. The WHO has stated that if it received funding equivalent to the cost of one jet fighter annually for ten years, the incidence of tuberculosis worldwide could be halved.

Obviously, the fight against tuberculosis would be greatly aided by the introduction of novel control measures, such as highly-effective vaccines and immunotherapeutic agents and improved diagnostic tests. However, we cannot wait for these innovations: there is a huge burden of unnecessary suffering to be addressed now, and this will take a much greater effort than we, as a global community, appear to be willing to make. It is worth bearing in mind the words of Dr. Arata Kochi, Manager of the World Health Organization Global Tuberculosis Programme: “The growing tuberculosis epidemic is no longer an emergency only for those who care about health, but for those who care about justice”, and also the words of King Solomon (Proverbs 12:28): “Along the way of justice there is life.”

References

- Anastasis, D., Pillai, G., Rambiritch, V. and Abdool Karim, S. S. (1997) A retrospective study of human immunodeficiency virus infection and drug-resistant tuberculosis in Durban, South Africa. *Tubercle. Lung Dis.* **1**, 220–224.
- Antonucci, G., Girardi, E., Raviglioni, H. C. and Ippolito, G. (1995) Risk factors for tuberculosis in HIV-infected persons. A prospective cohort study. *J. Am. Med. Assoc.* **274**, 143–148.
- Bevan, E. (1997) Tuberculosis treatment is expensive for patients in developing countries. *Br. Med. J.* **315**, 187–188.
- Bhatti, N., Law, M. R., Morris, J. K., Halliday, R. and Moore-Gillon, J. (1995) Increasing incidence of tuberculosis in England and Wales: A study of the likely causes. *Br. Med. J.* **310**, 967–969.
- Bouvet, E., *et al.* (1993) A nosocomial outbreak of multidrug-resistant *Mycobacterium bovis* among HIV-infected patients. A case-control study. *AIDS* **7**, 1453–1460.
- Cantwell, M. F. and Binkin, N. J. (1997) Impact of HIV on tuberculosis in sub-Saharan Africa: A regional perspective. *Tubercle. Lung Dis.* **1**, 205–214.
- Carpels, G., *et al.* (1995) Drug resistant tuberculosis in sub-Saharan Africa: An estimation of incidence and cost for the year 2000. *Tubercle. Lung Dis.* **76**, 480–486.
- Centers for Disease Control. (1993) The 1993 revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. *Morb. Mort. Wkly. Rep.* **41–17**, 1–19.
- China Tuberculosis Control Collaboration. (1996) Results of directly observed short-course chemotherapy in 112,842 Chinese patients with smear-positive tuberculosis. *Lancet* **347**, 358–362.
- Chintu, C. and Zumla, A. (1997) Pediatric Tuberculosis and the HIV Epidemic. In: Zumla, A., Johnson, M., Miller, R. F., eds. *AIDS and Respiratory Medicine*. London: Chapman and Hall, pp. 153–163.
- Chowdhury, A. M. R., Chowdhury, S., Islam, M. N., Islam, A. and Vaughan, J. P. (1997) Control of tuberculosis by community health workers in Bangladesh. *Lancet* **350**, 169–172.
- Chretien, J. (1990) Tuberculosis and HIV. The cursed duet. *Bull. Int. Union Tuberc. Lung Dis.* **65**(1), 25–28.
- Chum, H. J., O'Brien, R. J., Chonde, T. M., Graf, P. and Rieder, H. L. (1996) An epidemiological study of tuberculosis and HIV infection in Tanzania, 1991–1993. *AIDS* **10**, 299–309.
- Citron, K. M. (1997) *Coming Out of the Shadow*. London: Crisis — Working for Homeless People.
- Clark, G., Kelley, M., Grange, J. M. and Hill, C. (1987) A re-evaluation of the evolution of mycobacterial disease in human populations. *Curr. Anthropol.* **28**, 45–62.

- Cohn, D. L., Bustreo, F. and Raviglione, M. C. (1997) Drug resistant tuberculosis: Review of the worldwide situation and the WHO/IUATLD global surveillance project. *Clin. Infect. Dis.* **24** (Suppl. 1), S121–S130.
- Coker, R. and Miller, R. (1997) HIV associated tuberculosis. *Br. Med. J.* **314**, 1847.
- Collins, C. H., Grange, J. M. and Yates, M. D. (1997) *Tuberculosis Bacteriology. Organization and Practice*. 2nd edn. Oxford: Butterworth-Heinemann.
- Communicable Disease Report. (1995) Outbreak of hospital acquired multidrug resistant tuberculosis. *CDR Weekly* **5**(34), 161.
- Cosivi, O., Meslin, F. X., Daborn, C. J. and Grange, J. M. (1995) Epidemiology of *Mycobacterium bovis* infection in animals and humans, with particular reference to Africa. *OIE. Sci. Tech. Rev.* **14**, 733–746.
- Cosivi, O., *et al.* (1998) Zoonotic tuberculosis due to *Mycobacterium bovis* in developing countries. *Emerg. Infect. Dis.* **4**, 59–70.
- Daborn, C. J., Grange, J. M. and Kazwala, R. R. (1996) The bovine tuberculosis cycle — an African perspective. *J. Appl. Bacteriol.* **81** (Symposium Supplement), 27S–32S.
- Daley, C. L. (1995) The typically ‘atypical’ radiographic presentation of tuberculosis in advanced HIV disease. *Tubercle. Lung Dis.* **76**, 475–476.
- Dolin, P. J., Raviglione, M. C. and Kochi, A. (1994) Global tuberculosis incidence and mortality during 1990–2000. *Bull. Wld. Hlth. Org.* **72**, 213–220.
- Drobniewski, F., Pablos-Méndez, A. and Raviglione, M. C. (1997) Epidemiology of tuberculosis in the world. *Semin. Resp. Crit. Care. Med.* **18**, 419–429.
- Dwyer, B., *et al.* (1993) DNA restriction fragment analysis to define an extended cluster of tuberculosis in homeless men and their associates. *J. Infect. Dis.* **167**, 490–494.
- Enarson, D. A. and Rouillon, A. (1998) The Epidemiological Basis of Tuberculosis Control. In Davies, P. D. O., ed. *Clinical Tuberculosis*, 2nd edition. London: Chapman and Hall. pp. 36–52.
- Festenstein, F. and Grange, J. M. (1991) Tuberculosis and the acquired immune deficiency syndrome. *J. Appl. Bacteriol.* **71**, 19–30.
- Friedman, L. N., Williams, M. T., Singh, T. P. and Frieden, T. R. (1996) Tuberculosis, AIDS, and death among substance abusers on welfare in New York City. *New Engl. J. Med.* **334**, 828–833.
- Goletti, D., *et al.* (1996) Effect of *Mycobacterium tuberculosis* on HIV replication. Role of immune activation. *J. Immunol.* **157**, 1271–1278.
- Gordin, F. M., *et al.* (1996) The impact of human immunodeficiency virus infection on drug resistant tuberculosis. *Am. J. Resp. Crit. Care. Med.* **154**, 1478–1483.
- Grange, J. M. (1992) The mystery of the mycobacterial persistor. *Tubercle. Lung Dis.* **73**, 249–251.
- Grange, J. M. and Yates, M. D. (1993) Re-emergence of tuberculosis. *Br. Med. J.* **306**, 931–932.
- Grange, J. M. and Yates, M. D. (1994) Zoonotic aspects of *Mycobacterium bovis* infection. *Vet. Microbiol.* **40**, 137–151.

- Kent, R. J., Uttley, A. H., Stoker, N. G., Miller, R. and Pozniak, A. L. (1994) Transmission of tuberculosis in British centre for patients infected with HIV. *Br. Med. J.* **309**, 639–640.
- Kochi, A. (1991) The global tuberculosis situation and the new control strategy of the World Health Organization. *Tubercle.* **72**, 1–6.
- Kochi, A., Varelzdis, B. and Styblo, K. (1993) Multidrug-resistant tuberculosis and its control. *Res. Microbiol.* **144**, 104–110.
- Ledru, S., *et al.* (1996) Impact of short-course therapy on tuberculosis drug resistance in South-West Burkina Faso. *Tubercle. Lung Dis.* **77**, 429–436.
- Leitch, A. G., *et al.* (1995) Why disease due to *Mycobacterium tuberculosis* is less common than expected in HIV-positive patients in Edinburgh. *Resp. Med.* **89**, 495–497.
- Lienhardt, C. and Rodriguez, L. C. (1997) Estimation of the impact of the human immunodeficiency virus infection on tuberculosis: Tuberculosis risks revisited? *Tubercle. Lung Dis.* **1**, 196–204.
- Luo, C., *et al.* (1994) Human immunodeficiency virus type-1 infection in Zambian children with tuberculosis: Changing seroprevalence and evaluation of a thiacetazone-free regimen. *Tubercle. Lung Dis.* **75**, 110–115.
- Mangtani, P., Jolly, D. J., Watson, J. M. and Rodrigues, L. C. (1995) Socioeconomic deprivation and notification rate for tuberculosis in London 1982–91. *Br. Med. J.* **310**, 963–966.
- Marchal, G. (1997) Recently transmitted tuberculosis is more frequent than reactivation of latent infections. *Tubercle. Lung Dis.* **1**, 192.
- Mitchison, D. A. (1998) How drug resistance emerges as a result of poor compliance during short course chemotherapy for tuberculosis. *Int. J. Tuberc. Lung Dis.* **2**, 10–15.
- Mitike, G., Kebede, D. and Yenneneh, H. (1997) HIV infection and antituberculosis drug resistance among pulmonary tuberculosis patients in Harar Tuberculosis Centre, Ethiopia. *East Afr. Med. J.* **74**(3), 154–157.
- Moda, G., Daborn, C. J., Grange, J. M. and Cosivi, O. (1996) The zoonotic importance of *Mycobacterium bovis*. *Tubercle. Lung Dis.* **77**, 103–108.
- Moore-Gillon, J. (1998) Tuberculosis and poverty in the developed world. In: Davies, P. D. O., ed. *Clinical Tuberculosis*, 2nd edition. London: Chapman and Hall. pp. 383–393.
- Morse, D. L. (1994) Multidrug resistance. The New York experience. In: Porter, J. D. H., McAdam, K. P. W. J., eds. *Tuberculosis: Back to the Future*. Chichester: John Wiley, pp. 225–230.
- Murray, C. J., Styblo, K. and Rouillon, A. (1990) Tuberculosis in developing countries: Burden, intervention and cost. *Bull. Int. Union Tuberc. Lung Dis.* **65**(1), 6–24.
- Neville, K., *et al.* (1994) The third epidemic — multidrug-resistant tuberculosis. *Chest* **105**, 45–48.

- Nitta, A. T., Davidson, P. T., De Koning, M. L. and Kilman, R. J. (1996) Misdiagnosis of multidrug tuberculosis possibly due to laboratory-related errors. *J. Am. Med. Assoc.* **276**, 1980–1983.
- Nunn, P., *et al.* (1994) The effect of human immunodeficiency virus type-1 on the infectiousness of tuberculosis. *Tubercle. Lung Dis.* **75**, 25–32.
- O'Reilly, L. M. and Daborn C. J. (1995) The epidemiology of *Mycobacterium bovis* infection in animals and man: A review. *Tubercle. Lung Dis.* **76** (Supplement): 1–46.
- Pirkis, J. E., *et al.* (1996) Time to initiation of anti-tuberculosis treatment. *Tubercle. Lung Dis.* **77**, 401–406.
- Raviglione, M. C., Snider, D. E. and Kochi, A. (1995) Global epidemiology of tuberculosis. Morbidity and mortality of a worldwide epidemic. *J. Am. Med. Assoc.* **273**, 220–226.
- Raviglione, M. C. and Luelmo, F. (1996) Update on the global epidemiology of tuberculosis. *Curr. Iss. Publ. Hlth.* **2**, 192–197.
- Raviglione, M. C. and Nunn, P. (1997) Epidemiology of Tuberculosis. In: Zumla, A., Johnson, M. A., Miller, R. F., eds. *AIDS and Respiratory Medicine*. London: Chapman and Hall, pp. 117–141.
- Reichman, L. B. (1991) The U-shaped curve of concern. *Am. Rev. Resp. Dis.* **144**, 741–742.
- Rieder, H. L. (1995) Methodological issues in the estimation of the tuberculosis problem from tuberculin surveys. *Tubercle. Lung Dis.* **76**, 114–121.
- Rouillon, A., Perdrizet, S. and Parrot, R. (1976) Transmission of tubercle bacilli: The effects of chemotherapy. *Tubercle.* **57**, 275–299.
- Schulzer, M., Fitzgerald, J. M., Enarson, D. A. and Grzybowski, S. (1992) An estimate of the future size of the tuberculosis problem in sub-Saharan Africa resulting from HIV infection. *Tubercle. Lung Dis.* **73**, 52–58.
- Sheldon, C. D., King, K., Cock, H., Wilkinson, P. and Barnes N. C. (1992) Notification of tuberculosis: How many cases are never reported? *Thorax* **47**, 1015–1018.
- Small, P. M., *et al.* (1994) The epidemiology of tuberculosis in San Francisco — A population-based study using conventional and molecular methods. *N. Engl. J. Med.* **330**, 1703–1709.
- Solomon, S., Anuradha, S. and Rajasekaran, S. (1995) Trend of HIV infection in patients with pulmonary tuberculosis in South India. *Tubercle. Lung Dis.* **76**, 17–19.
- Spence, D. P. S., Hotchkiss, J., Williams, C. S. D. and Davies, P. D. O. (1993) Tuberculosis and poverty. *Br. Med. J.* **307**, 759–761.
- Turett, G. S., *et al.* (1995) Improved outcomes for patients with multi-drug resistant tuberculosis. *Clin. Infect. Dis.* **21**, 1238–1244.
- UNAIDS/WHO. (1997) Fact sheet: *Report on the Global HIV/AIDS Epidemic, December 1997*. Geneva: World Health Organization. November 26th 1997.

- Vareldzis, B. P., *et al.* (1994) Drug resistant tuberculosis: Laboratory issues. World Health Organization recommendations. *Tubercle. Lung Dis.* **75**, 1–7.
- Waller, H. T. (1982) Tuberculosis and socio-economic development. *Bull. Int. Union Tuberc.* **57**, 202–205.
- World Health Organization. (1994a) *TB — A Global Emergency*. Geneva: World Health Organization (WHO/TB/94.177).
- World Health Organization. (1994b) *Guidelines for Surveillance of Drug Resistance in Tuberculosis*. Geneva: World Health Organization (WHO/TB/94.178).
- World Health Organization. (1996) *Tuberculosis in the Era of HIV. A Deadly Partnership*. Geneva: World Health Organization (WHO/TB/96.204).
- World Health Organization. (1997a) *Global Tuberculosis Control. WHO Report 1997*. Geneva: World Health Organization Global Tuberculosis Programme (WHO/TB/97.225).
- World Health Organization. (1997b) *Anti-Tuberculosis Drug Resistance in the World. The WHO/IUATLD Project on Anti-Tuberculosis Drug Resistance Surveillance*. Geneva: World Health Organization Global Tuberculosis Programme.
- World Health Organization. (1998) *The World Health Report 1998*. Geneva: World Health Organization.