Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
EDITORIAL

Prevention and control of tuberculosis during air travel

The potential transmission of tuberculosis infection on board aircraft reported first in the 1990s, the emergence of multidrug-resistant tuberculosis (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB) as serious public health problems, and the outbreak of severe acute respiratory syndrome (SARS) in 2003 have raised considerable anxiety among travellers, public health authorities, airline companies and the media. A number of contact investigations has shown that transmission of *Mycobacterium tuberculosis* may occur, although rarely, during long (more than 8 h) flights from an infectious source (a traveller with infectious pulmonary tuberculosis) to other passengers sitting in proximity. However, as yet, no cases of active tuberculosis disease following exposure on board aircraft have been reported.

In this special issue of the journal devoted to tuberculosis and air travel, Dowdall et al. describe the perspective of the air companies, stressing the importance of having a regulatory framework such as the WHO International Health Regulations (IHR). The appropriate technology to ensure quality of air in the cabin of the aircraft, the role of the airline in managing a person suspected of tuberculosis, and the essential collaboration between airline and public health authorities are emphasized. However, the limitations of air companies in preventing an infectious person from travelling are also clearly expressed, showing that, regardless of the willingness to cooperate with public health authorities, it will not be easy to prevent potential exposures on board.

Based on an analysis of reported patterns and epidemiological characteristics, Scholten et al. demonstrate that in Canada, air travel by individuals with active tuberculosis increased in the period 2006–2008. The authors describe the difficulty in obtaining complete information on passengers for contact investigation. They note that 82% of the 104 reported active tuberculosis cases were highly infectious, sputum smear-positive patients. Expectedly, a vast majority (87%) of reported active tuberculosis cases were people born outside Canada.

Marienau et al. from United States Centres for Disease Control describe tuberculosis investigations associated with air travel over a period of 1.5 years. They found that only 22% (758) of presumed contacts of 131 index cases had tuberculosis test results reported. Among them, 182 (24%) passenger-contacts had positive test results, but positivity was strongly associated with other risk factors for tuberculosis infection (OR 23; *p* < 0.001). No case of active tuberculosis was ever reported among contacts. Therefore, the risk of *M. tuberculosis* transmission during air travel remains difficult to quantify, although it is presumably low.

A detailed analysis by Kornoyo-Duong et al. on three investigations among contacts of air travellers with infectious tuberculosis shows that 15 out of 16 air travellers who tested positive for latent tuberculosis infection were from countries with high tuberculosis incidence. Therefore, establishing a relationship between on board exposure and transmission of infection is unwarranted.

Martinez et al. present the main features of the 3rd edition of the WHO guidelines on the prevention and control of tuberculosis during air travel which was published in 2008. This version includes guidance on the assessment of infectiousness and on the procedures, roles and responsibilities involved in the prevention of transmission of infection on board aircraft. It also describes the way to deal with incidents when they occur, the basic provisions of IHR, and the measures that could apply to incidents related to the potential of tuberculosis transmission among air travellers. Much of the information and guidance contained in this document may also be useful for prevention and control of other airborne infectious diseases in the context of air travel.

In a concluding article of this special issue, Plotkin and Hardiman describe the provision of the International Health Regulations (2005) to address the risk of international spread of airborne diseases such as tuberculosis during air travel and transportation.

Overall, this special issue underscores the importance of monitoring tuberculosis transmission that can occur during air travel while emphasizing clearly that current procedures for contact investigation are heavy and often not very productive. More research is needed to better assess the real risk of
transmission during air travel. Likewise, innovative and simpler procedures that, first, reduce the risk of having an infectious passenger on board and, second, allow rapid investigation of possible contacts need to be explored rapidly if investigation efforts have to become feasible on a larger scale and more cost-effective than they appear to be today.

References

1. Driver CR, Valway SE, Morgan WM, Onorato IM, Castro KG. Transmission of *M. tuberculosis* associated with air travel. *JAMA* 1994;272:1031–5.
2. Kenyon TA, Valway SE, Ihle WW, Onorato IM, Castro KG. Transmission of multidrug-resistant *Mycobacterium tuberculosis* during long airplane flight. *N Engl J Med* 1996;334:933–8.
3. Wright A, Zignol M, Van Deun A, Falzon D, Ruesch Gerdes S, Feldman K, et al, for the Global Project on Anti-Tuberculosis Drug Resistance Surveillance. Epidemiology of antituberculosis drug resistance 2002–07: an updated analysis of the Global Project on Anti-Tuberculosis Drug Resistance Surveillance. *Lancet* 2009;373(9678):1861–73.
4. Wilder-Smith A. The severe acute respiratory syndrome: impact on travel and tourism. *Travel Med Infect Dis* 2006;4(2):53–60.
5. WHO. *Tuberculosis and air travel: guidelines for prevention and control*. 2nd ed., http://whqlibdoc.who.int/hq/2006/WHO_HTM_TB_2006.363_eng.pdf; 2006.

Léopold Blanc*
Stop TB Department, World Health Organization, Avenue Appia 20, Geneva, Switzerland
*Corresponding author.
E-mail addresses: blancl@who.int (L. Blanc), ravigliomet@who.int (M. Raviglione)

Available online 6 May 2010