

## Multidrug-resistant tuberculosis

The ideal number of drugs needed and treatment duration are crucial issues in the management of multidrug-resistant tuberculosis (MDR-TB). Thus, we read with interest the Article by the Collaborative Group for the Meta-Analysis of Individual Patient Data in MDR-TB treatment-2017,<sup>1</sup> the results of which support our proposal,<sup>2</sup> from 2015, to classify anti-tuberculosis drugs on the basis of their toxicity, and sterilising or bactericidal activity.

The findings provide compelling evidence on the use of fluoroquinolones (levofloxacin or moxifloxacin), plus linezolid and bedaquiline as the base for the initial treatment of tuberculosis strains with rifampicin resistance or multidrug resistance.<sup>1</sup> However, we believe that had these drugs been used from the start, some of the findings of the meta-analysis,<sup>1</sup> namely the optimal number of drugs needed to treat the cases (five) and treatment duration (18–20 months), would need to be refined. Both results were obtained because most of the drugs included in the regimens that had been evaluated by the meta-analysis have no effect on treatment outcomes,<sup>1</sup> and many show poor or nil bactericidal and sterilising activity.<sup>2–4</sup>

Two or three susceptible drugs, with good bactericidal and sterilising activity, is known to be enough to treat almost all cases of tuberculosis, even in individuals with MDR-TB.<sup>5</sup> Moreover, treatment duration could be reduced to 9–12 months if two or three sterilising drugs are included in the regimen.<sup>2,3</sup> Given that levofloxacin or moxifloxacin, linezolid, and bedaquiline have good bactericidal and sterilising profiles,<sup>2,4</sup> these three drugs, administered for 9–12 months, should theoretically be enough to cure rifampicin-resistant or MDR-TB.<sup>6</sup> In cases of fluoroquinolone resistance, fluoroquinolone could be replaced by clofazimine or delamanid, as both have good sterilising activity.<sup>2,6</sup>

We agree that clinical trials are needed to ascertain the optimal combination and treatment duration (because using only the required number of drugs would lower the toxicity and price of regimens) and to improve treatment adherence.

JAC was a member of the Green Light Committee of WHO from 2002 to 2013, coordinator of the MDR-TB Unit of the International Union against Tuberculosis and Lung Disease from 2006 to 2017, and a member of the writing committee of the WHO MDR-TB Guidelines of 2006, 2008, 2011, and 2016.

We declare no competing interests.

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- 1 Collaborative Group for the Meta-Analysis of Individual Patient Data in MDR-TB Treatment-2017. Treatment correlates of successful outcomes in pulmonary multidrug-resistant tuberculosis: an individual patient data meta-analysis. *Lancet* 2018; **392**: 821–34.
- 2 Caminero JA, Scardigli A. Classification of anti-TB drugs: a new potential proposal based on the most recent evidence. *Eur Respir J* 2015; **46**: 887–93.
- 3 Fox W, Ellard GA, Mitchison DA. Studies on the treatment of tuberculosis undertaken by the British Medical Research Council Tuberculosis Units, 1946–1986, with relevant subsequent publications. *Int J Tuberc Lung Dis* 1999; **3** (suppl 2): S231–79.
- 4 Caminero JA, Sotgiu G, Zumla A, Migliori GB. Best drug treatment for multidrug-resistant and extensively drug-resistant tuberculosis. *Lancet Infect Dis* 2010; **10**: 621–29.
- 5 American Thoracic Society and Centers for Disease Control. Treatment of tuberculosis and tuberculosis infection in adults and children. *Am Rev Respir Dis* 1986; **134**: 355–63.
- 6 Caminero JA, Piubello A, Scardigli A, Migliori GB. Proposal for a standardised treatment regimen to manage pre- and extensively drug-resistant tuberculosis cases. *Eur Respir J* 2017; **50**: 1700648.