HHS Public Access

Author manuscript

Lancet Infect Dis. Author manuscript; available in PMC 2018 September 01.

Published in final edited form as:

Lancet Infect Dis. 2017 September ; 17(9): 898–899. doi:10.1016/S1473-3099(17)30457-7.

Successful Cure of Extensively Drug-Resistant Pulmonary Tuberculosis in a Young Child

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To the Editor

In December 2015, we described a two year-old child from the United States who developed extensively drug resistant (XDR) pulmonary tuberculosis (TB) after a three-month visit to India.[1] She has been closely followed for two years after completing 18 months of directly observed therapy with an individualized drug regimen including streptomycin (first 6 months), linezolid, para-aminosalicylic acid, cycloserine and clofazimine. In the absence of clinical or microbiological markers, low-radiation exposure computed tomography (CT) was used as a rapid biomarker to guide treatment. The child remains symptom free with no adverse medication effects, other than transient hypothyroidism (now resolved) and persistent mild bronze skin discoloration, and we believe that she has achieved stable cure. Importantly, no contacts tested developed infection or disease, consistent with the belief that young children are noninfectious.

After exposure, young children are at high risk of disease progression, including disseminated TB and meningitis.[2] Given limited evidence, in part due to challenges of establishing definitive diagnoses, young children with multi drug resistant (MDR) TB are managed based on recommendations developed for adults. However, the pathophysiology of TB is different in young children. Young children also have excellent regenerative capacities and potentially better treatment outcomes than adults. Moreover, a number of immunological biomarkers, such as interferon gamma release assays, initially considered to be promising, have performed inconsistently in young children. Therefore, there is need for developing pathogen-specific technologies, not limited by the location or accessibility of

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Declaration of interests

Dr. Jain reports grants from National Institutes of Health, USA, during the conduct of the study; grants from National Institutes of Health, USA, grants from Gilead BioSciences, USA, outside the submitted work; In addition, Dr. Jain has a patent PCT/US13/059897 pending.

tissues harboring the pathogens.[3,4] Some technologies would be basic and accessible in remote areas while others might be complex, but more accurate and available at referral centers. For example, advanced medical technologies are increasingly available in various Indian cities, which have alarmingly high rates of MDR-TB. Costs are also substantially lower (US ~$50–$100 for CT and MRI and $300 for PET per scan at private, for-profit centers) in developing nations,[5] compared to ~$500–$2,000 for CT and $3000 for PET in the US.[6] Recent technological developments have significantly lowered radiation exposure and allowed rapid imaging, avoiding the need for sedation. Each chest CT in this child was equivalent to three-months of natural background radiation, or a single screening mammogram, or four trans-Atlantic airplane round-trips.[1] Interestingly, the mortality risk for (adult) patients with MDR- and XDR-TB on treatment is similar to that due to cancers,[5] where expensive technologies, including advanced imaging continues to be routinely utilized. Therefore, we need to practice pragmatism regarding the potential risks and benefits of emerging technologies, especially when dealing with drug-resistant infections.

Acknowledgments

This work was supported by the NIH Director's Transformative Research Award R01-EB020539 (S.K.J.), R01-HL131829 (S.K.J.), and the Pediatric Infectious Diseases NIH Training grant (T32-AI052071). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

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