A rare cause of pulmonary tuberculosis
Heidi H Y Chan, John Mpe

ABSTRACT
We present a case of bovine tuberculosis in a 50-year-old Māori female. She had worked for approximately 7 years at a local freezing works where animal organs were cleaned and packed. The diagnosis was established 4 weeks after commencement of first-line anti-TB therapy. While human zoonotic tuberculosis may be uncommon in developed countries, its diagnosis still has important public health and treatment implications.

Tuberculosis (TB) remains a devastating infectious disease worldwide. Mycobacterium bovis is an increasingly rare cause of human tuberculosis. Despite its rarity, the diagnosis of bovine TB has important public health and patient management implications. Positive tuberculin skin tests and interferon gamma release assays may be observed with Mycobacterium bovis infections. Human-to-human transmission of bovine TB has been reported, but is rare.

Case Report
A 50-year-old immunocompetent female was admitted to our hospital following a motor vehicle accident, during which she sustained an injury to her forearm. Her admission chest X-ray showed bilateral upper lobe infiltrates, suspicious for pulmonary TB.

Our patient is a New Zealand-born Māori, who grew up locally in Northland. She has been employed for the last 7 years at the local freezing works, specifically working on the offal floor where animal organs (mainly beef) were cleaned and packed. No other animal contact, overseas travel or sick contact was reported.

Her history was noteworthy for 6 months of an early morning cough with small amounts of sputum, 8 kg loss of weight over 18 months, and lethargy. Her physical examination was unremarkable.

A mycobacterium tuberculosis complex was cultured on her sputum and she was initiated on standard TB therapy (isoniazid, ethambutol, rifampicin and pyrazinamide). However, repeated smear tests returned 4+ positive, despite treatment in the following weeks. Phenotyping, including the Wayne assay, revealed resistance to pyrazinamide (susceptible however to other agents). This was confirmed with pncA gene mutation analysis which detected a mutation indicating either an M. bovis or BCG strain. The next step using molecular typing (MIRU) showed results typical with M. bovis confirming the diagnosis, so although Xpert TB polymerase chain reaction test is available, it was not performed in her case.

Pyrazinamide was withdrawn from her treatment. She went on to complete 2 months of ethambutol, rifampicin and isoniazid, and then 7 months of rifampicin and isoniazid. Her case was notified, and contact tracing involving household members and workmates was undertaken as per usual for mycobacterial TB, as there were no available guidelines on bovine TB to follow. The results of these are not known to us. On subsequent follow-up, our patient was deemed cured with no known complications from her illness.

Discussion
Tuberculosis remains a global public health threat and the most devastating human infectious disease, especially in developing countries. Zoonotic TB is rare in humans. Most zoonotic cases are caused
by *Mycobacterium Bovis*, with global estimates of less than 1.4% of TB cases outside of Africa attributed to *Mycobacterium bovis*. While human zoonotic TB may be uncommon in developed countries, small pockets of the disease are thought to remain, with median incidence rates of 0.03 and 0.16 per 100,000 population in Australia and New Zealand respectively. In New Zealand, 276 cases of TB were notified in 2013, and of these, *M. bovis* was identified in three cases.2 The situation is different in low income countries, with crude estimates of seven cases per 100,000 population.3-5

*M. bovis* affects a broad range of mammalian hosts, including the brush-tail possum in New Zealand. Human infections occur through consumption of infected animal products, occupational exposure to infectious aerosols from infected animals or their carcasses and less frequently through direct contact via mucus membranes and broken skin. Human-to-human transmission of bovine TB occurs, but is much rarer, with only several case reports.6-9

There are no clinical, radiologic or pathologic features to distinguish disease caused by *M. tuberculosis* and *M. bovis*. Differentiation can only be definitively achieved by sophisticated laboratory methods involving culture, typing of isolates according to growth characteristics, biochemical properties, routine resistance to pyrazinamide and specific non-commercial nucleic acid techniques.

*M. bovis* has intrinsic resistance to pyrazinamide. Therapy for human bovine TB is extrapolated from experience with treatment of pyrazinamide-resistant *Mycobacterium tuberculosis*—with 2 months of rifampicin, ethambutol and isoniazid and 7 months of rifampicin and isoniazid.10,11

**Figure 1:** Chest X-ray of our patient showing bilateral upper lobe infiltrates suspicious for active pulmonary TB.
CLINICAL CORRESPONDENCE

Competing interests: Nil

Author information:
Heidi H Y Chan, House Officer, Whangarei Hospital, Whangarei; John Mpe, Physician, Department of Medicine, Whangarei Hospital, Whangarei.

Corresponding author:
Dr John Mpe, Department of Medicine, Private Bag 9742, Whangarei Hospital, Whangarei matlawene.mpe@northlanddhb.org.nz

URL:

REFERENCES:

Heidi H Y Chan, House Officer, Whangarei Hospital, Whangarei; John Mpe, Physician, Department of Medicine, Whangarei Hospital, Whangarei.

Corresponding author:
Dr John Mpe, Department of Medicine, Private Bag 9742, Whangarei Hospital, Whangarei matlawene.mpe@northlanddhb.org.nz