In total, 1095 *Mycobacterium tuberculosis* clinical isolates from 282 patients with drug-resistant and 813 with drug-sensitive tuberculosis (TB) in Poland during 2007–2011 were analysed. Seventy-one (6.5%) patients were found to have strains of Beijing genotype as defined by spoligotyping. The majority of patients were Polish-born; among foreign-born a large proportion came from Chechnya and Vietnam. Analysis showed strong associations between Beijing genotype infection and MDR, pre-XDR and XDR resistance, with a considerable relative risk among new patients, suggesting that this is due to increased spread of drug-resistant strains rather than acquisition of resistance during treatment.

**Key words:** Beijing family, drug resistance, genotype, spoligotyping
from Chechnya (38%) and Vietnam (24%), where the Beijing genotype has been reported to be most prevalent (Merker et al., 2015). The others were from Georgia, Russia, Tibet, India, Ukraine, Slovakia, one from Africa (Nigeria) and one from North America (USA). Altogether 282 Drug Resistant (DR) and 813 Drug Sensitive (DS) isolates from 1095 patients were identified. The results of drug resistance testing are shown in Table II. While 27 (38%) of the Beijing strains were MDR, 15 (21.1%) pre-XDR and 4 (5.4%) XDR, only 59 (5.8%) of the 1024 non-Beijing strains were MDR, 16 (1.6%) pre-XDR and 14 (1.4%) were XDR during the same period.

Several studies have suggested an association between young age and the Beijing genotype family (Buu et al., 2009; Zanini et al., 2014). Although the Beijing genotype is more common among young patients, we did not find such a correlation in the group of Polish-born patients (9.5%), but observed it among foreign-born males (58.6%) (P < 0.001). This suggests that the primary reservoir of Beijing family strains in Poland is young immigrants who came to Poland from the East. It is possible that some of the Beijing strain infections were in fact acquired among Polish-born patients during transmission from young and middle-aged immigrants crossing the Polish border and seeking employment.

An additional argument for the transmission of tuberculosis is the observation that the majority of patients with Beijing-TB belonged to the group of newly diagnosed patients, both among immigrants and Polish-born population.

Numerous molecular epidemiological studies, carried out in various geographical settings, have suggested an association between drug resistance, specifically MDR-TB, and the Beijing genotype strain (Filliol et al., 2002; Toungousova et al., 2004; Drobniewski et al., 2005; Kubica et al., 2005; Park et al., 2005; Caws et al., 2006; Hasan et al., 2006; Victor et al., 2007; Dymova et al., 2014; Maeda et al., 2014). Review of molecular epidemiological data from XDR-TB strains has shown an association between XDR-TB and the Beijing genotype in isolates from South Africa, Estonia, China, Japan and Russia (Iwamoto, 2009; Dheda et al., 2010; Casali et al., 2012).

In this study the prevalence of drug-resistance was significantly higher (P < 0.001) in Beijing strains than in non-Beijing isolates (81.7% vs 21.9%). We found strong associations between Beijing genotype infection and MDR, pre-XDR and XDR resistance, with a considerable relative risk among new patients (P = 0.02), suggesting that it is increased spread of MDR-TB strains.
rather than acquisition of MDR-TB during treatment that defines this association.

This is the first study on Beijing-TB in the patient population in Poland. Further molecular and epidemiological analyses are required to determine the genetic relatedness between strains and analyse possible transmission of tuberculosis between patients.

Literature


