

Toxoplasma gondii in environmental air samples

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INTRODUCTION. *Toxoplasma gondii* is a cosmopolitan protozoan parasite that causes toxoplasmosis – one of the most prevalent parasitic infections in humans. The disease is generally asymptomatic in immunocompetent individuals; however, it may take a severe course in immunodeficient patients and in immature foetuses and infants, if the mother suffered from primary infection during pregnancy. One of the important routs of infection in humans is ingestion of oocysts excreted by infected felids to the environment (Cook et al. 2000; Dubey et al. 1996; Fayer et al. 2004, Lass et al., 2009, 12). However, there is no data about their occurrence in the air or about airborne transmission of these infections.

AIM OF THE STUDY. The aim of the study was to estimate the possible occurrence of *T. gondii* in environmental air samples collected from rural and urban areas of Poland, using sensitive molecular tools and microscopy, as well as to determine the genotype of detected parasites.

MATERIAL AND METHODS. A total of 71 samples were collected between 2013 and 2015 using membrane gelatine filters (3 μm pore size) and MD8AirSampler mobile apparatus, from kitchen gardens, recreational areas, and sandpits located in northern and north-eastern Poland. In Warmia-Masuria province, all of the samples were collected from villages; in Pomerania province, from both urban and rural areas (40:20). In order to concentrate and recover oocysts the filter was cut, mixed in a 50 mL tube with warm water (80°C), and suspension was centrifuged. The final pellet was analysed using microscopy and molecular methods: real-time PCR and LAMP assays targeting the *T. gondii* B1 gene. Positive samples were sequenced and genotyped, as well as equivalent of the total oocyst load in the sample was determined by using Q real-time PCR assay.

RESULTS. *T. gondii* DNA was detected in two (3 %) investigated samples, one originated from a yard in Gdynia (a city in Pomerania province) and one from a kitchen garden in Jankowice (a village in Warmia-Masuria province). Sequencing of positive samples confirmed result of PCR, and genotyping showed presence of *T. gondii* type I. Moreover, the presence of *T. gondii* oocysts was confirmed in one of the positive samples with the use of microscopy. All air samples collected around sandpits and recreational areas were negative. The results showed that *T. gondii* may be present in environmental air samples and that respiratory tract infections may play a role in the high prevalence of toxoplasmosis in humans and animals. This is the first epidemiological evidence that oro-faecal and foodborne toxoplasmosis may be traceable to an airborne respiratory origin and that this may represent a new, previously unknown transmission route.

Financial support: statutory work of the Department of Tropical Parasitology, MUG