CORRESPONDENCE

Toxoplasmosis in Germany

Epidemiology, Diagnosis, Risk factors, and Treatment

by Prof. Dr. med. Uwe Pleyer, Prof. Dr. med. Uwe Groß, Prof. Dr. med. Dirk Schlüter, Dr. rer. nat. Hendrik Wilking, and Prof. Dr. rer. nat. Frank Seeber in issue 25/2019

Additional Clinical Aspects

The CME article on toxoplasmosis in Germany (1) informs about clinical aspects and consequences of infection with *Toxoplasma gondii*. However, important clinical consequences of a chronic latent infection remain unmentioned, in particular the possible manifestation of neuropsychic disorders. Numerous epidemiological studies have shown an association between *T. gondii* seropositive status and mental illness (2).

A recently published study from Denmark (3) provides additional evidence for a causal relationship between the chronic latent infection with *T. gondii* and the occurrence of schizophrenia. As part of a Danish blood donor study involving more than 80 000 participants, a nested case-control study was conducted. Data analysis with exclusively newly occurring diseases took into account the temporal sequence of infection status and disease outcome and showed a statistically significant increase in the incidence rate ratio (2.78, 95% confidence interval: [1.27; 6.09]).

This result is consistent with previous studies and with already known neurobiological mechanisms (2,

4). Studies of mammals have shown that a chronic infection with *T. gondii* affects the regulation of neurotransmitters and in particular dopamine metabolism (4). In humans as host organisms, these changes could contribute to the increased incidence of mental disorders in chronically infected individuals.

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In Reply:

We are grateful for the reference to a possible association between toxoplasmosis infection and psychiatric disorders. In a meta-analysis (1), an association was found between toxoplasmosis (as measured by anti-*T. gondii* IgG positivity) and disorders such as schizophrenia (42 studies, odds ratio [OR]: 1.43), bipolar disorder (11 studies; 1.52; 95% confidence interval: [1.06; 2.18]), addiction (four studies; OR: 1.91; [1.49; 2.44]), and obsessive-compulsive disorder (two studies; 3.4; [1.73; 6.68]). The question of causality of toxoplasmosis for these psychiatric disorders is still controversial. For instance, in the cited study (2), it has to be taken into account that toxoplasmosis before clinical manifestation of schizophrenia could be demonstrated for only 28 individuals, of the study population of 80 000 persons. Thus, the “statistically significant increase in the incidence ratio of 2.78” is based on a very small database.

It is clear that toxoplasmosis in rodents leads to behavioral changes. However, these data (including those about the production of neurotransmitters) cannot be directly transferred to humans, as the massive number of intracerebral parasites and the severity of encephalitis that occurs especially in mice does not occur in humans (3).

Also, the reference to a change in dopamine metabolism due to chronic infection is controversial. Thus, experiments have convincingly refuted the idea that mice have increased dopamine levels due to *T. gondii* infection or to direct synthesis of dopamine by the parasite (4, 5). Likewise, seropositivity does not automatically mean that cysts are present in the brain, not even in animal models (3).

Based on these open questions and the currently (still) unconvincing causality between chronic infection and psychiatric disorders in humans (which may change with new imaging techniques), we have refrained from presenting this topic in this CME article (6).

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Conflict of interest statement

The authors of the contributions declare that no conflict of interest exists.

CLINICAL SNAPSHOT

Furuncular Myiasis Caused by Mango Fly Larvae

A 67-year-old man presented with subcutaneous swellings on his back after returning from a 3-week holiday in Senegal. He reported noticing a “crawling sensation” around his shoulder blades during the last few days of his stay. He had often gone around with his upper body unclad and had put his washing out to dry close to vegetation. We noted two firm, elastic, furuncular subcutaneous swellings, 1 to 2 cm in diameter, each with a central opening and partly drained after treatment by a primary care physician (Figure 1a). A “maggot-like” structure was found and identified as the third larval stage of the mango fly (*Cordylobia anthropophaga*) (Figure 1b), which is thought to be the principal

cause of furuncular myiasis in sub-Saharan Africa. Infection is by direct skin contact with sandy soil or with clothing that has been put on the ground to dry and had eggs laid on it. Mature larvae can be squeezed out or removed with tweezers.

Extraction and local antiseptic treatment usually achieve rapid healing. In endemic regions it is recommended that skin contact with the ground be avoided and washing be hung up to dry indoors. The botfly *Dermatobia hominis* is the cause of a similar clinical manifestation in Central and South America.

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