A state-of-the-art bacteriological diagnostics of lyme borreliosis

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Introduction. Lyme disease is a multistage and multisystem disorder predominantly affecting the skin, but also involving the joints, heart and nervous system. Inspite of low mortality rate it can be complicated by Lyme neuroborreliosis—painful meningoradiculitis (Bannwarth syndrome) and lymphocytic meningitis, or post-treatment Lyme disease syndrome' (PTLDS) or chronic Lyme disease, by atrioventricular block and myocarditis. The reported number of confirmed cases in USA has increased in the past few decades from 11,700 in 1995 to 27,200 in 2013. In Europe, the highest incidences of Lyme disease are found in Scandinavian countries and central Europe (Austria, Slovenia and Germany). In Germany the incidence is estimated as 261 per 100,000 people per year. Neurological manifestations are reported in 3–12% of patients with Lyme disease in both Europe and the USA. Direct detection methods for B. burgdorferi are of limited use for the diagnosis of Lyme neuroborreliosis. Thus, borreliosis should be properly diagnosed and treated. Subject: latest achievements in bacteriological diagnostics of Lyme borreliosis has been under study.

Aim: To perform systemic review of updates in laboratory diagnostics of Lyme borreliosis to improve diagnostic algorithm of the diseases.

Materials and methods: Reviewing and logical analysis of numerous scientific resources (articles, morbidity and mortality datasheets etc.) has been undertaken to reveal contemporary tendencies in diagnostics of Lyme borreliosis.

Result. The diagnosis of Lyme neuroborreliosis should be ideally made by direct detection of the pathogen within the CSF or blood but it works in 10% and 25% cases correspondingly in case of early forms of infections and fails in late forms of infections. PCR provides higher sensitivity – around 20% cases can be diagnosed by it. Indirect serological tests are the mainstay of the laboratory diagnosis of Lyme borreliosis and are based on two-tier approach, involving an initial sensitive screening test (generally ELISA) and, in the event of a positive or equivocal result, a confirmatory immunoblotting. Specific antibodies against B. burgdorferi can persist in the CSF or blood serum for months or even years after treatment, and are not suitable biomarkers to judge the therapeutic response. Seropositivity rates for Borrelia are commonly 5–20% in endemic areas. Recent studies have revealed a reliable increase in CSF concentrations of the B-cellattracting chemokine CXCL13 in patients with early Lyme neuroborreliosis. CXCL13 was found to be elevated in nearly all patients with early Lyme neuroborreliosis, even before B. burgdorferi antibodies were present. In contrast to B. burgdorferi antibodies, CXCL13 levels fall rapidly after the start of antibiotic therapy.

Conclusion. The laboratory diagnostics of Lyme borreliosis depends on clinical manifestation and can be based on direct detection of pathogen, its antigens or DNA in the sample, or indirect detection of antibodies with additional evaluation of chemokine CXCL13 in CFU as a biomarker of neuroborreliosis.