Novel diagnostic test for Lyme borrelioisis

The diagnosis of Lyme borreliosis, the most common vector-borne disease in the Northern hemisphere, is challenging and can sometimes be cumbersome. Although a sign like the bull's eye (Erythema migrans) skin rash can indicate disease and thus the need for appropriate treatment, oftentimes this gets unnoticed. In addition, currently approved diagnostic test suffers from two major pitfalls: (i) low sensitivity to accurately predict the presence of disease when the symptoms are of short duration (the first weeks/months of an infection), and (ii) importantly, inability to discriminate an active /ongoing from a past infection when symptoms are of longer duration. These pitfalls can greatly complicate the proper treatment of Lyme borreliosis.

With substantial funding from horstingstuit-foundation (€400,000 for a period of 4 years), we aimed to develop a new diagnostic test for Lyme borreliosis that could have the potential to detect early disease and the ability to differentiate between an active and past disease. To this end, we have implemented a novel protein microarray approach and screened almost 1300 proteins of *B. afzelii* (the most predominant *Borrelia* genospecies causing LB in Europe) with serum samples derived from infected patients as well as healthy individuals. In parallel, we have derived serum from experimental animal models to screen the protein microarray chip. This double-edged approach has enabled us to identify several novel antigens in both the datasets that demonstrate very high sensitivity in early disease and have the potential to discriminate between active and past disease.

With additional generous funding (€150,000 for a period of 2 years) from horstingstuit-foundation, we further aim to validate our current findings with a larger set of independent human samples and a smaller more focused protein microarray chip (with ~200 *B. afzelii* antigens). This will enable us to identify the most optimal set of novel antigens and unquestionably fuel the road towards clinical development and commercialization of a new and improved diagnostic test for LB. This project will be important for swift and correct diagnosis of early disease, which is critical for its prognosis. In addition, it will enable distinguishing an active infection from a past infection in patients with longer-lasting complaints, guiding appropriate antibiotic (re)treatment. The timing of this project is excellent, now that one of the most-used commercial diagnostic test is no longer available for purchase/commercial use. This state-of-art translational research is conducted in one of Europe's leading Lyme borreliosis research laboratories headed by Prof. Dr. Joppe W. Hovius (internist-infectiologist and principal investigator, as well as head of the Amsterdam UMC Multidisciplinary Lyme disease Center) at Amsterdam University Medical Centers.