

Design and evaluation of a novel OspA-based vaccine for the prevention of Lyme borreliosis

Andreas Meinke

Valneva Austria GmbH, Austria

At present, there is no vaccine available to prevent Lyme borreliosis in humans, although it has been shown that the disease can be averted by immunization with an OspA based vaccine (LYMERix™). In Europe three *Borrelia* species, *B. afzelii*, *B. burgdorferi* and *B. garinii* are the main pathogens causing Lyme borreliosis, the most common tick-borne zoonosis. Outer surface protein A (OspA) is one of the dominant antigens expressed by the spirochetes when present in the tick vector. The various pathogenic *Borrelia* species express different OspA serotypes on their surface: *B. burgdorferi* (serotype 1), *B. afzelii* (serotype 2), *B. garinii* (serotypes, 3, 5 and 6) and *B. bavariensis* (serotype 4). In order to target these *Borrelia* species, we have designed a multivalent OspA-based vaccine. The vaccine includes three proteins, each containing the C-terminal half of two OspA serotypes linked to form a heterodimer. In order to stabilize the C-terminal fragment and thus preserve important structural epitopes, disulfide bonds were introduced and the immunogenicity increased by addition of a lipidation signal. Active immunization with the adjuvanted Lyme borreliosis vaccine protected mice from a challenge with spirochetes expressing either OspA serotype 1, 2 or 5, using infected ticks or in vitro grown bacteria as a challenge. Further immunological analyses (ELISA, surface binding and growth inhibition) indicated that the vaccine can provide protection against the majority of human pathogenic *Borrelia* species. This rational designed OspA-based vaccine is therefore suitable for global prophylaxis of Lyme borreliosis.

Biography

Andreas Meinke obtained his PhD in 1992 from the University of Freiburg and the University of British Columbia in Vancouver, Canada. Subsequent to his work at UBC, he moved to the Department of Microbiology and Genetics, University Vienna, as an Assistant Professor. In 1998, he joined the newly founded biotech company Intercell AG, now Valneva Austria GmbH. At present he is responsible at Valneva for pre-clinical and translational research. He has authored and co-authored more than 60 publications, lectured in several university programs and filed more than 20 patents in the field of antigen discovery and vaccine development.

Andreas.MEINKE@valneva.com