

Medical Science and Pharmaceuticals | Technology Offer

Recombinant MVA strains as potential vaccine against *Plasmodium falciparum* Malaria

Current Technology Status

Malaria is one of the most common and dangerous infectious diseases. Some 300 to 500 million people are infected with Malaria every year, leading to 1.5 to 2.7 million deaths (of which 50% are children under 5 years of age).

The pathogen *Plasmodium falciparum*, which is transmitted by the mosquito *Anopheles*, is the cause of *Malaria tropica* and is responsible for almost all lethal infections. 40% of the world's population lives in areas where malaria is endemic and where the pathogen is present. As a consequence of increased international travel and in the context of globalization and also due to climate changes, malaria cases are on the increase in industrialized countries. Meanwhile, one can find 6 sub-species of the mosquito *Anopheles* in Germany.

The situation is further complicated by the fact that the malaria pathogen develops strong resistance. The development of resistance is promoted by the use of medication against malaria as a prophylactic. For this reason, and in addition to finding new chemotherapeutics, research into prophylaxis concentrates on the development of vaccines.

It is known that during malaria infection immunological reaction mechanisms are activated which result in an increased resistance against the pathogen. Despite sustained attempts over the past two decades, no vaccine has yet been found that conveys a long-term protection against infection.

Secure your Advantage through Innovation

In a cooperation between the University of Heidelberg and the GSF Research Centre for Environment and Health, a new approach to the development of a vaccine was developed based on a highly promising target molecule. This target molecule is the main surface protein of the invasive form of the malaria pathogen during the blood stage, called *Merozoite Surface Protein-1*, or MSP-1, which is processed in smaller protein fragments and remains anchored as a complex on the surface of the parasite until the parasite enters erythrocytes. In this exposed position they can be recognised by the body's immune defense.

Animal studies as well as clinical studies in humans using MSP-1 and MSP-1 fragments have demonstrated their immunogenicity. In addition, epidemiological studies in endemic regions demonstrated a correlation between antibody titers against MSP-1 and immunity against malaria.

The protein MSP-1 is known to be the target of the humoral immune response. The cell immune response can be stimulated very effectively by a viral infection. The present invention takes advantage of a viral carrier organism to develop a vaccine against malaria. The invention describes the immunization using both prototypes of MSP-1 resp. fragments of these proteins, in the construction of recombinant vaccinia viruses of the strain MVA (*modified vaccinia virus Ankara*). These recombinant MVAs integrate the MSP-1 DNA in a stable form into the double-stranded virus genome. MVA is a non-infectious, well established virus strain which has been successfully used in smallpox vaccines for human use.

Your Advantage at a Glance

- vaccination by means of non-virulent, as vaccine well established smallpox viruses as carriers
- expression of both prototypes of the complete malaria antigen MSP-1, as well as fragments of the protein
- humoral and cellular immune response to vaccination
- promising candidate for the development of a vaccine with long term protective effect, which is currently not available
- high application potential
 - As a travel vaccine for approximately one million travelers and military personnel per year from industrialized nations
 - As vaccine for endemic regions (300-500 million infections per year)

Technology Transfer

The Technologie-Lizenz-Büro (TLB) GmbH is charged with the commercialization and now offers companies the opportunity to obtain a license to exploit this new and promising technology.

Patent Position

German, European and U.S. patent applications are pending (and further international patent applications)

For further information on "Malaria Vaccine", or other TLB Technologies on offer, please contact:

Dr Uta Weirich
uweirich@tlb.de

Technologie-Lizenz-Büro (TLB)
 der Baden-Württembergischen Hochschulen GmbH
 Ettlinger Straße 25, D-76137 Karlsruhe, Germany
 Tel +49 721 79004-0, Fax +49 721 79004-79
www.tlb.de