

Preparation and immunogenic properties of a recombinant West Nile subunit vaccine

Michael M. Lieberman,^{a*} David E. Clements,^a Steven Ogata,^a Gordon Wang,^a Gloria Corpuz,^a Teri Wong,^a Tim Martyak,^a Lynne Gilson,^a Beth-Ann Coller,^a Julia Leung,^a Douglas M. Watts,^b Robert B. Tesh,^b Marina Siirin,^b Amelia Travassos da Rosa,^b Tom Humphreys,^a and Carolyn Weeks-Levy^a

(a) Hawaii Biotech, Inc., 99–193 Aiea Heights Drive, Aiea, HI 96701, USA

(b) University of Texas Medical Branch, 301 University Boulevard, Galveston, TX 77551, USA

(*) Corresponding author. Tel.: +1 808 792 1309; fax: +1 808 487 7341. E-mail address:

mlieberman@hibiotech.com (M.M. Lieberman).

Vaccine: Volume 25, Issue 3, 5 January 2007, Pages 414–423

Abstract

While several West Nile vaccines are being developed, none are yet available for humans. In this study aimed at developing a vaccine for humans, West Nile virus (WNV) envelope protein (E) and non-structural protein 1 (NS1) were produced in the *Drosophila* S2 cell expression system. The C-terminal 20% of the E protein, which contains the membrane anchor portion, was deleted, thus allowing for efficient secretion of the truncated protein (80E) into the cell culture medium. The proteins were purified by immunoaffinity chromatography (IAC) using monoclonal antibodies that were flavivirus envelope protein group specific (for the 80E) or flavivirus NS1 group specific (for NS1). The purified proteins were produced in high yield and used in conjunction with adjuvant formulations to vaccinate mice. The mice were tested for both humoral and cellular immune responses by a plaque reduction neutralization test and ELISA, and by lymphocyte proliferation and cytokine production assays, respectively. The results revealed that the 80E and the NS1 proteins induced both high-titered ELISA and neutralizing antibodies in mice. Splenocytes from immunized mice, cultured in vitro with the vaccine antigens as stimulants, showed excellent proliferation and production of cytokines (IFN- γ , IL-4, IL-5, and IL-10). The level of antigen-stimulated lymphocyte proliferation and cytokine production was comparable to the level obtained from mitogen (phytohemagglutinin or pokeweed) stimulation, indicating a robust cellular response as well. These findings are encouraging and warrant further in vivo studies to determine the protective efficacy of the WNV vaccine candidate.

Link to full-text article:

<http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=16996661>