Evaluation of a MOMP-based DNA vaccine against *C. trachomatis* serovar E infection in a pig model

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Abstract

Chlamydia trachomatis is a bacterial pathogen that is the leading cause of bacterial "Sexual Transmitted Disease" (STD) in developing countries. Most often the infection is asymptomatic. However, if the infection remains untreated, it often results in pelvic inflammatory disease (PID), ectopic pregnancy, chronic pelvic pain in women, urethritis and epididymitis in men or infant pneumonia. The infection can easily be treated with antibiotics, but in most cases damage is already done before the bacterium is noticed. Immunization is considered to be the best approach to reduce *C. trachomatis* infections. However, so far no vaccine is available.

In this study, plasmid DNA (pWRG7079::MOMP) expressing the major outer membrane protein of a human *Chlamydia trachomatis* serovar E strain was tested for the ability to induce an immune response and protect against experimental genital infection with the same serovar. The vaccine was tested in pigs, as they are genetically, physiologically and immunologically related to humans and suitable for studying *C. trachomatis* infection of the genital system. To increase the immune response, GM-CSF and LTa+LTb were used as adjuvants. GM-CSF was administered seven days before immunization, while the other adjuvants were administered together with the vaccine. Ten pigs were randomly divided into two groups. One group received an intravaginal primo-vaccination and a booster of 500 µg pWRG7079::MOMP, while the other group received the placebo vaccine pWRG7079. All animals were challenged intravaginally with 10^8 $TCID_{50}$ of *C. trachomatis* serovar E. Pigs immunized with the DNA vaccine showed significantly less macroscopic lesions, vaginal excretion and chlamydial replication in the genital tract, as compared to placebo-vaccinated controls. A clear relationship could be detected between high stimulation indices in the lymphocyte proliferation assays and better protection. However, the infection could not be completely cleared.