Protection of Pigs against Genital *Chlamydia trachomatis* Challenge by Parenteral or Mucosal DNA Immunization

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We have evaluated protection against a genital *Chlamydia trachomatis* infection in a pig challenge model. Animals were immunized with a major outer membrane protein (MOMP)-based DNA vaccine carrying five pig-specific CpG motifs incorporated in the plasmid backbone (pWRG7079). Protection was promoted by administering the porcine granulocyte macrophage-colony stimulating factor (GM-CSF) and the *Escherichia coli* thermo-labile enterotoxin LT, which is an exceptionally potent mucosa-binding molecule, as adjuvants. Protection against genital *C. trachomatis* challenge through mucosal immunization (combined vaginal and nasal vaccine administration) was compared to systemic (intradermal) immunization. Mucosal vaccination resulted in significant protection characterized by less severe macroscopic lesions, less vaginal shedding of chlamydia and less bacterial replication in the urogenital tract of immunized pigs. Also, mucosal immunized pigs showed significantly higher proliferative responses of peripheral blood lymphocytes. Furthermore, the combination of nasal and vaginal immunization could induce serum antibody titers upon immunization and early upon challenge with *C. trachomatis* serovar E. However, the infection could not be eradicated. Systemic immunization was significantly less efficient at eliciting protection, which emphasizes the need for a mucosal vaccine in order to obtain significant protection against genital *C. trachomatis* infection.