ANALYSIS OF THE VACCINE-INDUCED IMMUNITY AGAINST GASTROINTESTINAL PARASITES SUGGESTS A CRUCIAL ROLE FOR MUCOSAL IgG1 AND MEMORY NK CELL RESPONSES

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Introduction: The aim of our study was to unravel the immune mechanisms underlying the protective vaccine-induced immune responses against the gastrointestinal parasites *Ostertagia ostertagi* and *Cooperia oncophora* in cattle.
Methods: Cattle and mice were immunized with native experimental vaccines, and the antigen-specific antibody and cellular responses were analyzed and compared with the responses induced by non-protective recombinantly produced versions of these vaccines.
Results: *In vitro* re-stimulation of lymphocytes from calves vaccinated with the protective experimental vaccines resulted in a marked proliferation of NK and $CD3^-CD335^-CD21^-$ cells. In the case of the *C. oncophora* vaccine, antigen-specific proliferation of CD4 and CD8 T cells was also observed. In addition, a strong mucosal IgG1 response was observed in vaccine-protected calves following challenge infection. Injection of mice with the native vaccines similarly resulted in an antigen-specific NK and $CD3^-CD335^-CD21^-$ cell proliferation together with a strong IgG1 response, indicating that this antigen-specific immune response is conserved among species. In contrast to the native vaccines, the recombinant versions failed to both induce a strong cellular memory response in cattle and mice, and to trigger a secondary mucosal IgG1 response in cattle following challenge.
Conclusion: The outcome of this research suggests an important role for NK cells, $CD3^-CD335^-CD21^-$ cells and IgG1 antibodies in the protection induced by both native anti-parasite vaccines. The data also indicates that mice could potentially be used as a model to test recombinant anti-parasite vaccines for their immunogenicity.