Immunisation of cattle against heartwater by infection with Cowdria ruminantium elicits T lymphocytes that recognise major antigenic proteins 1 and 2 of the agent.

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Abstract:

There is growing evidence that immunity of cattle to Cowdria ruminantium infection is mediated by T lymphocytes. C. ruminantium antigens that stimulate these responses are therefore of considerable importance to the development of a sub-unit vaccine against the disease. We have examined T cell responses against recombinant analogues of the surface-exposed C. ruminantium major antigen 1 (MAP1) a 28.8 kDa protein and MAP2 (21 kDa) antigen in cattle immunised by infection and treatment. Vigorous and sustained proliferative responses to both antigens were observed in peripheral blood mononuclear cells from immune cattle. MAP1-specific responses were predominantly restricted to cluster of differentiation four antigen positive T cells (CD4+ T cells). Reverse transcription polymerase chain reaction (RT-PCR) analysis of cytokine expression by T cell lines derived from this population revealed strong expression of interferon gamma (IFN-gamma), interferon alpha (IFN-alpha), tumour necrosis factor alpha (TNF-alpha), tumour necrosis factor beta (TNF-beta), interleukin-2 receptor alpha (IL-2Ralpha) transcripts, and weak expression of IL-2 and IL-4. Supernatants from these T cell cultures contained IFN-gamma protein. CD4+ T cell clones specific for MAP1 were generated. Two of these clones proliferated in the presence of autologous infected endothelial cells. In contrast, the response to MAP2 was characterised largely by proliferation of gamma delta (gammadelta) T cells. RT-PCR analysis of cytokine expression by T cell lines which were dominated by gammadelta T cells revealed expression of IFN-gamma, TNF-alpha, TNF-beta, IL-2Ralpha transcripts. Supernatants of these T cell cultures also contained IFN-gamma protein. Our findings indicate that immunisation of cattle by infection with C. ruminantium results in generation of MAP1- and MAP2-specific T cell responses that may play a role in protection against the pathogen.