ANALYSIS OF THE VACCINE INDUCED IMMUNE RESPONSE AGAINST THE
ABOMASAL PARASITE OSTERTAGIA OSTERTAGI IN CATTLE SUGGESTS A PIVOTAL
ROLE FOR NATURAL KILLER CELLS
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Vaccination against gastro-intestinal nematodes in cattle would offer a valuable alternative
to the use of anthelminthic drugs. However, the development of such vaccines is largely
hampered by a lack of knowledge on the protective immune responses against these
parasites. The aim of this study was to compare the immune response induced by a host-
protective experimental vaccine against Ostertagia ostertagi in cattle, based on native ASP
antigens combined with QuilA adjuvant, with the responses induced by non-protective
versions of the same vaccine, i.e. native ASPs combined with Al(OH)₃ and a Pichia pastoris
expressed ASP combined with QuilA. Each animal was immunized three times
intramuscularly with a three-week interval. After the final immunization, animals received a
trickle infection of 1000 infective L3 larvae/day for 25 days. All results were compared to
the results obtained from non-vaccinated, non-infected (naïve) animals.

We found no significant vaccine induced changes in frequencies of lymphocyte
subpopulations in peripheral blood during the course of the whole experiment. Surprisingly,
in vitro exposure of peripheral blood mononuclear cells from nASP/QuilA vaccinated
animals to nASP solely resulted in detectable proliferation of natural killer (NK) cells. This
effect was not observed in animals vaccinated with the non-protective vaccines, nor in
naïve animals, showing that only the protective vaccine induced a systemic NK cell
‘memory’ to the nASP antigen.

Phenotypical analysis of abomasal and abomasal lymph node mononuclear cell (MC)
fractions showed no vaccine induced changes in frequencies of lymphocyte subpopulations.
Although MC isolated from the abomasal LN of all infected animals responded to nASP,
proliferation was highest in the nASP/QuilA vaccinated group, again with NK cells being the
strongest responders. This response was not observed in naïve animals.

The outcome of this study suggests a previously unidentified role for systemic NK cell
‘memory’ in vaccine induced protective immune responses against Ostertagia ostertagi.