INTERLEUKIN-6 CYTOKINE ENHANCES INTESTINAL IMMUNITY

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Cytokines are molecules that regulate the character and duration of an immune response. In this regard they can drive a particular type of immune response to enhance protection from pathogens (Fresno et al., 1997). Interest in enhancing intestinal immunity, and in particular, intestinal IgA antibody production in chickens (Muir et al., 2000), has led to early investigations into cytokine regulation of avian mucosal immunity. Ramsay et al. (1994) observed significant reductions in IgA producing plasma cells in the intestine of IL-6 gene knockout mice, demonstrating the regulatory role of IL-6 in intestinal IgA antibody production. Production of IgA antibody was restored following the supply of exogenous IL-6. The present study was designed to investigate the potential of IL-6 to enhance intestinal IgA antibody production in chickens. As chicken IL-6 had not been identified at the time these studies were undertaken, porcine IL-6 (pIL-6), which has shown cross-species reactivity, was used.

At 14 days of age all chickens received an intraperitoneal immunisation of whole killed Salmonella typhimurium in adjuvant, followed with an oral booster of whole killed S. typhimurium at 28 days of age. All birds were then randomly allocated to four cytokine treatment groups. On each of the next four days, pIL-6 treated birds received 0.5mL by gavage containing either 1 or 10 μg pIL-6 or 10 μg porcine IL-3 cytokine control per bird per day. A third group of birds were treated with 10 μg of pIL-6 only on the second and fourth day after the oral booster. Control birds received 0.5mL phosphate buffered saline on the four days following the oral booster. At 35 days of age serum and intestinal scrapings (IS) were collected for ELISA determination of anti- S. typhimurium IgA antibody titres.

In a second experiment groups of eight birds were unvaccinated, vaccinated or vaccinated with four daily oral pIL-6 treatments. From 35 days of age all birds were challenged with live S. typhimurium via cohabitation on litter with S. typhimurium infected seeder birds. At 7 and 14 post challenge (pc) isolation of S. typhimurium from cloacal swabs, and enumeration of S. typhimurium in the spleen and liver was undertaken.

Repeated oral delivery of 10μg pIL-6 following an oral booster immunisation significantly (P<0.05) increased anti-S. typhimurium IgA antibody titres in the serum and IS. Oral delivery of 10μg pIL-6 on days 2 and 4 following the oral booster significantly (P<0.05) increased anti-S. typhimurium IgA in the IS. On day 7 pc fewer S. typhimurium, (not statistically significant) were isolated from the spleen and liver in pIL-6 treated birds. Similarly, at 14 days pc, pIL-6 treated birds were less frequently infected (not statistically significant) with S. typhimurium than control birds. Further, fewer S. typhimurium were isolated from the spleen and liver of these chickens.

These studies demonstrate the potential for orally administered pIL-6 to significantly enhance local IgA antibody production at the intestinal surface in chickens. Increased IgA antibody production resulted in reduced levels of S. typhimurium infection.


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