Response to wing-web challenge of Rous sarcoma virus subgroups in some chicken breeds

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Received 17 February 1998; revised 5 October 1998

Response to wing-web challenge (WWC) of Rous sarcoma virus (RSV) subgroups was studied in 4-8 weeks old chicks of a light breed, a heavy breed and a cross between an indigenous black plumage Bantam fowl and Australorp breed. Wing-web tumor (WWT) began to develop within one week in response to virus subgroups A (BS-RSV) and C [RSV (RAV-49)] challenge. In chicks challenged with subgroup D [RSV (RAV-50)] virus it took a minimum of 4 weeks for development of WWT. Positive response to WWC by subgroups A, C and D virus was 84%, 100% and 52%, respectively. The duration of exhibition of positive response was maximum for subgroup A virus, followed by subgroup D and minimum for subgroup C virus.

In chickens, leucosis is caused by avian leucosis virus, a RNA tumour virus and is classified into five subgroup (A, to E). Subgroup A virus accounts for nearly 80% of cases of lymphoid leucosis (LL) followed by subgroup B virus. Subgroups C and D virus are of rare occurrence. Subgroup E virus exists in both exogenous and endogenous state but is not highly pathogenic. An avian leucosis virus with a wide host range belonging to a new subgroup 'J' has also been reported.

Not much known about the genetics of resistance to tumour development after infection with lymphoid leucosis virus (LLV), as it is difficult to do so for two reasons:

(a) Study is to be performed with birds known to be susceptible to the virus used.

(b) Methods are not perfect at inducing LL, even after extended periods of observation.

LLV shares 3 major subgroup specific properties i.e. host range, interference pattern and antigenicity with RSV. RSV therefore, is used as a laboratory model in place of LLV, as results of RSV infection are available by the 8th day post-infection, while results of LLV infection are available after over 4 months.

Therefore, the present study was conducted to have preliminary information of RSV subgroups infection in some chicken breeds/cross in India.

Virus—RSV of subgroup A (BS-RSV) was received as a gift from Dr L.N. Payne, Institute for Animal Health, AFRC, Houghton Laboratory, UK, RSV subgroup C [RSV (RAV-49)] and D [RSV (RAV-50)] were gifted by Dr. L.B. Crittenden, RPRL, East Lansing, USA. The titre of each of the three virus subgroups was 10^6 pock forming units/ml.

Chicks—Four to eight weeks old chicks of a light breed-White Leghorn (WL) from a research institute, a heavy breed Rhode Island Red, (RIR), from a university farm and a cross between an indigenous black plumage Bantam fowl (Bt) from a Zoological garden and Australorp (AO) breed of a university farm were used.

Virus inoculation and monitoring of WWT development—Twenty five chicks each of WL, RIR and Bt x AO were distributed equally, into three groups for the three subgroup viruses and were inoculated at a wing-web with a dose of 0.2 ml of a subgroup of virus containing 10^3 pock forming units/ml, on the same day. Virus dilution was prepared in Eagle's minimum essential medium (MEM) containing 1.0% antibiotic (benzyl penicillin and streptomycin). A control group of 05 chicks each of WL, RIR and Bt x AO was also monitored simultaneously. These chicks were inoculated with 0.2 ml of MEM -antibiotic solution, lacking virus.

Development of WWT was monitored every alternate day post-inoculation uptill maximum growth/any other observable change. The chicks were later sacrificed for virus isolation.
The reason for similar duration required for Rous tumour regression explains the incidence of development of WWT in the chicks challenged with this virus subgroup. It had been suggested 

It could be suggested that as LLV-A is ubiquitous in distribution and is most prevalent in field, therefore, the immune system of host should be well tuned to defend the host against this subgroup of virus. However, ironically in field the incidence of LL due to LLV-A is maximum (i.e. 80%) 

It had been envisaged while explaining the role of cell mediated immune response in regressing WWT (induced by subgroup A virus) in chicks, that, the destruction of tumour cells was caused by synthesized thymus dependent cells (T-cells) which was not effective in chickens with progressive WWT due to the presence of blocking factors that protect tumour cells from cell mediated immune attack. This is why perhaps, due to interaction between the tumour cells and the T-cells the duration of exhibition of positive response to subgroup A virus challenge was maximum.

Serological studies have indicated that B and D subgroups are closely linked in two major properties i.e. of envelope and interference pattern 

References