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Consensus S1 Glycoprotein Induces Partial Protection against Avian Infectious Bronchitis in Chicken

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Avian Infectious Bronchitis (IB) is an economically important OIE listed acute contagious viral disease of the poultry. We studied the protection potential of consensus S1 glycoprotein against IB. A consensus sequence was derived out of 67 S1 glycoprotein gene sequences of IB virus and synthesized commercially. The gene was cloned in yeast expression vector, transformed into *Saccharomyces cereviciae* cells and induced to express the recombinant S1 protein (rS1) which was confirmed by Western blot. Specific pathogen free (SPF) chicks (n=50) were randomly divided into five groups (n=10/group) namely, rS1 (100µg/bird), rS1 plus adjuvant (rS1 glycoprotein 100µg plus Montanide ISA 71 R VG), inactivated vaccine, live IBV vaccine and unvaccinated control. At two weeks of age, the birds were vaccinated through intramuscular route except live IBV vaccine, which was administered intranasally. A booster was given two weeks later. The yeast expressed rS1 induced significantly higher antibody response ($P<0.01$) in ELISA as well as stimulation index in lymphocyte transformation test ($P<0.05$) than that of the unvaccinated control group. All the vaccinated groups showed significantly higher ($P<0.01$) $CD4^+$ as well as $CD8^+$ T cells than that of the unvaccinated control group. The adjuvant also enhanced the antigen specific humoral as well as cellular immune responses. The experimental birds were challenged with Massachusetts standard challenge virus (10^4 ELD_{50} per bird through ocular instillation) two weeks post booster immunization and representative birds (n=6/group) were sacrificed to collect the trachea on day 5 post-challenge for assessing the protection by ciliostasis test. The live IBV vaccine afforded 71.7% protection, while it was only 40 and 45% in the rS1 alone or with adjuvant, respectively. In conclusion, the rS1 glycoprotein conferred partial protection against IB, though it induced antigen specific immune responses.