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From Birds to Human, the Common Strategies Towards One Health

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Abstract

Infectious pathogens like retroviruses can cause a variety of degenerative multisystemic lethal diseases in human and large number of animal species. Rous Sarcoma Virus (RSV) was the first described transmissible retrovirus causing solid lethal tumors in infected chickens. The classical strategies of vaccine development failed to produce an effective vaccine that can protect birds from infection or RSV-associated disease. We used the innovative molecular biology tools to engineer a replication-defective vector expressing the Env glycoproteins of RSV. We used this vector to transduce primary chicken fibroblasts and express RSV glycoproteins at their cell surface. Cell lysates of these cells were used as cell-associated antigen to immunize adult chickens. All immunized chickens produced high titers of protective antibodies against the highly pathogenic RSV strain (1). This technology was transposed to New Castle Disease virus in chicken chowing similar protection results against NDV pathogenic strain (2). To increase the safety and the specificity we moved to development of DNA vaccines in mammals against lentiviruses. As lentiviruses are chronic infectious disease that cause persistent progressive degenerative diseases, viruses use multiple strategies to persist despite host specific immune responses. These strategies rendered difficult development of effective vaccines. We developed innovative lentiDNA vectors as vaccines (3-7) and used them in animal models to demonstrate their efficacy to induce long lasting virus-specific immune responses and protection against pathogenic viruses. Our data showed that our lentiDNA vaccines are powerful inducers of long-lasting immune responses. these immune responses correlated with protection against homologous and heterologous pathogenic virus strains (8-10).

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