

Creating Attenuated Infectious Bursal Disease Virus from Dual-Promoter Plasmids

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Introduction

Infectious Bursal Disease Virus (IBDV), a virus of the Birnaviridae family, leads to immunosuppression in young chickens by damaging B cells. Due to the increasing number of variant IBDV strains, there is a critical need to develop a method to produce attenuated viruses for vaccine development. Using the approach of reverse genetics, the genome of the virus was manipulated and studied in the lab. To make this process more efficient, researchers developed a method using dual-direction promoters to quickly produce IBDV. This technique makes it easier to weaken strong versions of the IBDV virus, potentially aiding in faster and more efficient vaccine development.

Method

The study used a human kidney cell grown in a nutrient-rich medium along with a chicken cell line. A strain of the IBDV virus was taken from a chicken and adapted to grow in both cell types. Changes were introduced in copies of the virus's genetic material made by RT-PCR to create mutations in these versions that contained either a VP1 or VP3 protein. They later added a version of the VP1 protein with a "FLAG" tag and purified it with anti-FLAG agarose, which was later analyzed using mass spectrometry. They used a system with two plasmids with dual-direction promoters inserted into the human cells. Specific changes in the cells were observed under a microscope to confirm the successful recreation of the IBDV virus.

Result

The results of dual-direction promoters suggested that this new two-plasmid system could improve the efficiency of making the IBDV virus infectious. They also concluded that FLAG-tagged proteins can reduce the activity of proteins in the virus and could help make copies of a part of the virus's genetic material.

Conclusion

In conclusion, the researchers created a dual-promoter plasmid system using two components in which Pol II and Pol I were organized in the same direction to recreate the IBDV virus quickly. This system does not require extra components for the production of two important proteins, VP1 and VP3. Using this system, they created a version of the IBDV virus that expresses VP1-FLAG, which reduces the virus's ability to multiply but does not affect its ability to trigger an immune response. This suggests that this method could be used to create a weakened version of the IBDV virus that could potentially be used as a live vaccine.

Keyword

Infectious Bursal Disease Virus, Immunosuppression, Reverse Genetics, Vaccine Development, Dual-Direction Promoters.