Poster

Manufacturing a vaccine against Porcine Circovirus Type 2 (PCV2) using Baculovirus Expression Vector Systems (BEVS) in Trichoplusia ni

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Keywords: Porcine Circovirus; Trichoplusia ni; Vaccine.

ABSTRACT

Motivation: PCV associated disease (PCVAD) is one of the most important and economically significant swine diseases. Morbidity and mortality ratios in affected animals are 30% and 80%, respectively (1). Porcine Circovirus 2 (PCV2) is the viral agent behind the disease. The world population of pigs was 1 billion in 2014 (2) and there are only four vaccines comercialised againts PCV2. The current production is not sufficient to supply all regions in pig-producing countries and the disease continues to be endemic in the whole world. Two of the commercialised vaccines, Ingelvac CircoFlex® and Porcilis PCV®, are subunit vaccines based on the PCV2 capsid protein manufactured in insect cells by the Baculovirus Expression System (BEVS) (3). The aim of this project is the optimization of variables for manufacturing of a "bio-better" vaccine against PCV2, in which the capsid protein will be produced by using the BEVS for accumulation in insect lavae instead of insect cells, with the purpose of making a sustainable supply to the under-served market around the world.

Methods: For manufacturing of the antigenic part of the vaccine, the capsid protein (Cap) of a strain of PCV2 was expressed in Trichoplusia ni larvae by using the BEVS following protocols of the FLYLIFE platform of Bionaturis. The expression construct was cloned into Bionaturis' Master Viral DNA for preparation of the Working Viral Bank (WVB), a recombinant baculovirus able to accumulate the PCV2 antigen in the larvae under conditions optimized during this work. The antigen was recovered from the larvae by downstream processing involving steps of homogenization, clarification and chromatography for final purification until meeting the specifications for the vaccine antigen.

Results: The WVB was successfully produced in Sf21 insect cells. The upstream variables for accumulation of the antigen in larvae were optimized, involving oral infection of larvae with Manufacturing Viral Seeds prepared from the WVB. The optimization steps led to the recovery of 600 µg of antigen per larvae in crude extracts. Most of the contaminant were removed in the purification steps, which are still in the optimization process for reaching a final purity of 80% while keeping the cost of goods under the limits for making the vaccine economically sustainable.

Conclusions: FLYLIFE platform to allow for getting recombinant protein with low investment, minimum space, high-versatile protein expression, and biological safety.

REFERENCES

1. Opriessnig T., and Patterson A. (2010) Epidemiology and transmission of porcine circovirus type 2 (PCV2). Anim. Heal. Res. Rev., 11, 217–234.
2. Food and Agriculture Organization of the United Nations (FAO). Available from: http://www.fao.org/faostat/en/#home.
3. European Medicines Agency (EMA) [Internet]. Londres: EMA [citado 23 ene 2017]. Available from: http://www.ema.europa.eu/ema/.