Poster

Characterization of a baculovirus expression vector for producing an universal vaccine against human common cold virus

Juan José Infante Viñolo(1) , Elena de la Torre Madrid (1) y Mª Auxiliadora Pérez Repiso (1,*)

Bioorganic Research and Services (BIONATURIS) Avenida del Desarrollo Tecnológico, nº 11.

Parque Científico-Tecnológico Agroindustrial de Jerez. 11591 Jerez de la Frontera (Spain).

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ABSTRACT

Motivation: Human rhinovirus (HRV) is the primary etiologic agent of the common cold, which triggers approximately 50% of asthma and chronic obstructive pulmonary diseases. Direct and indirect costs associated to the common cold are approximately $50B per year only in the USA. Therefore, a vaccine decreasing the incidence of common cold is needed and has got a big potential market. The main challenges for developing a vaccine are: the high variety of virus serotypes and the need of a reliable and economically sustainable manufacturing process. HRV has an icosahedral capsid consists of 60 copies of the four structural proteins VP1, VP2, VP3 and VP4 (1). Bionaturis' partner in Maryland (USA) has modified the sequence of the structural proteins in order to raise universal immunity. Bionaturis is optimizing a method of manufacturing of a recombinant vaccine based on viral-like particles (VLPs) of the universal version of HRV.

Methods: For manufacturing the HRV-VLPs, Bionaturis is using its proprietary platform FLYLIFE, which consists in using lepidopteran larvae as biofactories taking advantage of the baculovirus expression technology. This type of manufacturing is more flexible and economically sustainable than traditional expression systems based on cell fermentors. The first part of the manufacturing process is to produce and characterize the working viral bank (WVB), i.e. a recombinant baculovirus able to accumulate the protein of interest when it infects lepidopteran larvae (2). Subsequently, the larvae are infected and harvested for purification of the HRV-VLPs. The product of interest is analyzed using techniques of basic proteomics like SDS-PAGE and immunodetection by Western blot.

Results: The WVB was successfully produced by cotransfection of insect cells Sf21 of Spodoptera frugiperda ovary with Bionaturis' Master Viral DNA based on the genome of the baculovirus AcMNPV (Autographa californica) and a transfer vector containing the expression cassette for making the HRV-VLPs (3). The purity and identity of the WVB generated was characterized by using genomic and proteomic techniques, certifying adequacy of its use for manufacturing HRV-VLPs in Bionaturis' FlyLife platform.

Conclusions: Flylife is a good candidate platform for manufacturing of a universal vaccine against human rhinovirus, combining aimed properties like lower capital investment, less space, and greater biological safety.

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