

Talk

Better vaccines for bad viruses: the case of Porcine Circovirus Type 2 (PCV2)



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ABSTRACT

Motivation: There are viruses of complex biology against which it is arduous to develop vaccines. Some examples in human health are the HIV or Hepatitis C viruses, among others. Recombinant vaccines promised to be the solution of the manufacturing problems of vaccines based on live-attenuated viruses. However, recombinant vaccines raise a decent humoral component of immunity but not the same potent T cell-mediated immunity of a replicative vaccine or a natural infection. In animal health, Porcine Circovirus Type 2 (PCV2) has spread all over the world because using a live-attenuated vaccine is unsafe and shows manufacturing problems, while the currently marketed killed or recombinant vaccines are able to prevent piglets from showing disease, but because of the poor cell-mediated immunity do not promote total viral clearance. In this project, we are testing the manufacturing of three candidates of recombinant vaccines, which have been modified to raise a more effective cell-mediated immunity, with the aim of providing to the animal health sector a definitive solution against PCV2. The strategies used in this project are diverse and could be applied to develop vaccines against human viruses of complex biology.

Methods: For sustainable antigen manufacturing in an eukaryotic system, we have created and characterized baculoviruses able to express the candidates in either insect cells or insect larva of *Trichoplusia ni*. We have compared the fermentative manufacturing platform against a linearly scalable platform, by using both cells and larvae for antigen production and recovery to a high degree of purity.

Results: After development of specific purification protocols, the three recombinant antigens were manufactured successfully in either platform, reaching purities of 75-85 %. However, the recovery yield of the antigens from the whole insect larvae was 10-fold higher. Immunogenicity of the antigens has been tested *in vitro* and is currently being tested *in vivo*.

Conclusions: In this project we have demonstrated that stable and properly folded recombinant vaccines engineered specifically to raise a potent T-cell mediated immunity could be manufactured in either insect cells or larvae by using the baculovirus expression technology. Having an economically sustainable platform for manufacturing better vaccines against viruses of complex biology both in animal and human health.

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