Novel application of bioinformatics in biological adjuvant development

1. **Title of Research :** Novel application of bioinformatics in biological adjuvant development

2. **Cross-School Research and Development Team Members**

Department	Name	Position
International Degree Program in Animal Vaccine Technology, NPUST.	Doan Thi Thu Dung	Assistant Professor
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Animal Vaccine, Omega Pharma JSC, Vietnam.	Nguyen Quang Phuc	General Director

3. **Content of Cross-School Research and Development**

The application of bioinformatics in biological adjuvant development aims to leverage computational tools, data analysis, and predictive modeling to accelerate the discovery, design, and optimization of effective adjuvants. By enhancing our understanding of the immune system and its interactions with adjuvants, bioinformatics contributes to the development of safer and more potent vaccines and therapeutic treatments. In this study, our aim is to utilize bioinformatic tools for the analysis of *Streptococcus suis* Suilysin as a biological adjuvant. Subsequently, we will clone, express, and evaluate the immunostimulant effect of the screened recombinant Suilysin proteins in vitro. Furthermore, the preliminary results will be used to apply for additional funding to assess the immunostimulant effect of the adjuvant when combined with the antigen in vivo.

4. **Description of Industrial Needs and Research Result Applications**

In industrial processes, there is a growing demand for effective and safe biological adjuvants. Biological adjuvants play a pivotal role in enhancing vaccine efficacy when combined with antigens. Currently, numerous commercial vaccines require improved efficacy through the incorporation of effective immunostimulant adjuvants. Our team has successfully cloned, expressed, and immunized mice with the immunostimulant effect of S. suis suilysin (rSly) . Our primary findings indicate that rSly is expressed at the expected size of 75 kDa and evaluated in mice, demonstrating its potential immunostimulant adjuvant. The next phase involves combining rSly with the spike protein of the Porcine Epidemic Diarrhea Virus (PEDV) to develop a subunit vaccine

against PEDV. We expect that the rSly can be applied to other antigens, thereby enhancing their vaccine efficacy.

5. Performance of Cross-School Research and Development

The role of cross-school research and development is pivotal in nurturing innovation, disseminating knowledge, and fostering collaborative advancements in education. In term of scientific knowledge, the successful formulation of a biological adjuvant significantly contributes to our understanding of immune enhancers. This knowledge can subsequently be applied to other antigens with low antigenicity. The use of rSly as an adjuvant also plays a crucial role in advancing novel adjuvant development. Particularly in Vietnam and Taiwan's animal vaccine industry, the discovery of an effective adjuvant for subunit vaccine development stands to fortify their portfolio, potentially elevating their global competitiveness. This underscores the broader impact of cross-disciplinary research in propelling scientific understanding and innovation to new heights, with tangible benefits for specific industries and beyond.

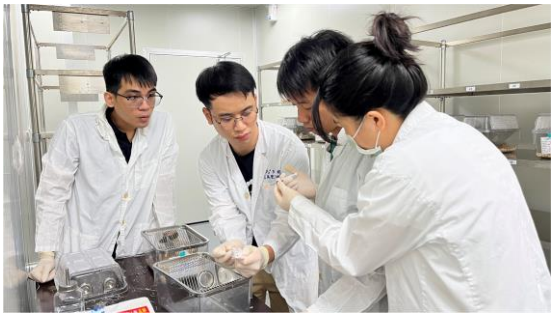

Fig 1：Injection and evaluation in mice.

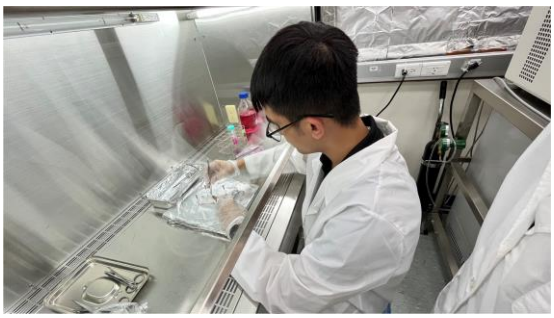

Fig 2：Injection and evaluation in mice.

Fig 3：Poster presentation at 99th NPUST Anniversary.

Fig 4：Meeting and discussion with Associate Professor, Bui Tran Anh Dao, Dean of Department of Anatomy and Histology in Vietnam in Oct 12, 2023.