

## REVIEW

Reviews in Aquaculture

# Towards a ‘systems’ approach for viral challenge experiments in shrimp: Reporting guidelines for publication

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## Abstract

The success of contemporary disease management strategies in shrimp aquaculture, such as the ‘systems’ approach, is predicated on robust knowledge of the conditions and interactions between the host, pathogen and environment that promote disease. Pathogen challenge experiments (PCEs) are a power tool for investigating these conditions and interactions. However, absence of accurately reported experimental detail in published PCEs limits scientific transparency, reproducibility, and the potential for the research to make progressive advancements contributing to contemporary shrimp disease management strategies. This review identifies and discusses key factors relating to the host (shrimp), pathogen (virus), and environment that should be carefully considered during the design and publication of PCEs. We offer substantial evidence of their impact on viral disease outcomes, drawn from the existing body of literature, to supporting their consideration. The prevalence of reported experimental details for these factors across 186 viral PCEs in shrimp were evaluated. The review highlights a concerning paucity of experimental detail reported in published shrimp PCEs. We propose a checklist for the minimum reportable information in the publication of shrimp viral PCEs, hereafter referred to as the Shrimp PCE Reporting Guidelines (SPERG). The guidelines aim to enhance the transparency and standardisation of reporting in published PCEs, ensuring that key factors pertaining to the shrimp, pathogen, and environment are adequately considered and documented. Adoption of SPERG is envisaged to empower researchers, reviewers, and readers to assess the internal and external validity of PCEs, facilitating critical evaluation and improved utility of PCE findings for contemporary disease management.

## KEYWORDS

best practice, bioassay, metadata, transmission trial, virus

## 1 | INTRODUCTION

Since the initial discovery of viral a pathogen in shrimp aquaculture<sup>1</sup> periodic reduction in global production volume has historically aligned with the emergence of significant pathogens, including infectious

hypodermal and haematopoietic necrosis virus (IHHNV, syn Decapod pensthyllamapnavirus 1), Monodon baculovirus (MBV, syn Penaeus monodon nudivirus), Taura syndrome virus (TSV), yellow head virus (YHV), white spot syndrome virus (WSSV), acute hepatopancreatic necrosis disease-causing *Vibrio parahaemolyticus* (VpAHPND),

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# Viral Challenge Review

**Robert K. Webster, Gregory  
Shaner, Neal K. Van Alfen**



## **Viral Challenge Review:**

*Immune studies of SARS-CoV2 and vaccines using preclinical modeling* William Murphy, Cordelia Dunai, Smita S. Iyer, 2025-01-28 The world wide pandemic involving SARS CoV2 in which high infectivity and pathogenesis necessitated the critical need for rapid and accurate preclinical modeling of this new virus Unfortunately the species restricted tropism of the CoV2 spike protein towards human and not mouse ACE2 seriously hampered the ability to understand pathogenesis and potential efficacy of potential therapeutics and vaccines Vaccine responses are particularly imperative given the likely need for continuous vaccine administration and viral evasion processes This barrier necessitated the development of genetically altered mouse models or adapting the virus to infect murine cells The immune responses underlying SARS CoV2 infection are complex as are the immunopathology associated with infection and resolution in which multiple organs and tissues are affected This is highlighted by the occurrence of prolonged pathology and symptoms termed Long Covid well after resolution of infection and also coupled with the high mutation rate of the virus Preclinical models allow for mechanistic dissection of the pleiotropic effects of the virus as well as vaccine responses These can include mouse models but also involve non human primate models all of which have advantages but limitations that must be considered when extrapolating to humans

Preclinical models may also include in vitro modeling components **New-generation vaccines and novel vaccinal strategies against infectious diseases of livestock, wild and companion animals** Denis Archambault, Raul Manzano Roman, Suresh Kumar Tikoo, Christophe Chevalier, Brad Pickering, 2023-08-25 Emerging and re emerging infections in particular those caused by viruses are expected to rise in correlation among other factors with climate changes Antibiotic resistance is another issue that will limit the therapeutic arsenal against bacterial and parasitic infections Therefore one must be adequately prepared to overcome and prevent current and novel infections and vaccination remains the optimal way to fight infectious diseases in humans This is also true for many impacting diseases of livestock and companion animals to which there are no available vaccines First attenuated and inactivated and second subunit generation vaccines have their limitations To overcome this efforts have been made in recent years to develop novel vaccine types such as virus like particle VLP viral vector and DNA based vaccines in humans and animals The recent success in utilizing RNA technology based vaccines to fight SARS CoV 2 to limit the severity of clinical symptoms and mortality constitutes a promising way to develop such vaccines against animal diseases Development of novel molecules or materials with adjuvant or immunostimulatory activity to adequately stimulate the innate immune response and therefore the pathogen specific adaptative immune response as well as the identification of suitable antigenic material that would bring broad protection against infectious agent variants are other key issues to be considered in developing safe and innovative immunization strategies **Moving Towards Allogeneic Cellular Therapies: Opportunities and Challenges** Federico Simonetta, Alice Bertaina, Peter Bader, 2022-08-09 **Information and Communication Technology for Intelligent Systems** Tomonobu

Senjyu,Parikshit N. Mahalle,Thinagaran Perumal,Amit Joshi,2020-10-29 This book gathers papers addressing state of the art research in all areas of information and communication technologies and their applications in intelligent computing cloud storage data mining and software analysis It presents the outcomes of the Fourth International Conference on Information and Communication Technology for Intelligent Systems which was held in Ahmedabad India Divided into two volumes the book discusses the fundamentals of various data analysis techniques and algorithms making it a valuable resource for researchers and practitioners alike

**Why Vaccines to HIV, HCV and Malaria Have So Far Failed - Challenges to Developing Vaccines against Immunoregulating Pathogens** Shuo Li,Magdalena Plebanski,Peter Smooker,Eric J. Gowans,2016-09-14 Despite continuous progress in the development of anti viral and anti bacterial parasite drugs the high cost of medicines and the potential for re infection especially in high risk groups suggest that protective vaccines to some of the most dangerous persistent infections are still highly desirable There are no vaccines available for HIV HCV and Malaria and all attempts to make a broadly effective vaccine have failed so far In this Research Topic we look into why vaccines have failed over the years and what we have learn from these attempts Rather than only showing positive results this issue aims to reflect on failed efforts in vaccine development Coming to understand our limitations will have theoretical and practical implications for the future development of vaccines to these major global disease burdens AIDS Research Reviews Wayne C. Koff,Flossie Wong-Staal,Ronald C. Kennedy,1992 Nutrition Abstracts and Reviews ,1997 **Immunoregulatory Mechanisms of Interferon** Jorg Hermann Fritz,Claudia U. Duerr,2020-03-11 Interferons IFN belong to the family of cytokines and have been described first in the late 1950s as an inhibitory factor of viral replication Since then the impact of interferon has been greatly expanded and its function comprises a role not only in different types of infection cancer and autoimmunity but importantly also in immunehomeostasis IFN have important anti viral effects but it is becoming more and more evident that they are true immunomodulators and have an important impact on the development and maintenance of innate and adaptive immunity **Bacteriological Reviews** ,1972 **Microbiological Reviews** ,1987 **Critical Reviews in Immunology** ,2008 **Annual Review of Psychology** Janet T. Spence,1996 HIV Immunology and HIV SIV Vaccine Databases 2003 , **HIV Immunology and HIV/SIV Vaccine Databases** ,2003 **The Review of Reviews** Albert Shaw,1896 **Annual Review of Microbiology** Charles Egolf Clifton,1997 **The Review of Reviews** William Thomas Stead,1891 *American Monthly Review of Reviews* Albert Shaw,1896 **Annual Review of Phytopathology** Robert K. Webster,Gregory Shaner,Neal K. Van Alfen,2002 **Monthly Journal of Insurance Economics** ,1929

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