Efficacy of bath vaccination with a live attenuated Vibrio harveyi against vibriosis in Asian seashell fingerling, Lates calcarifer


Abstract

Vibrio harveyi causes vibriosis in various marine aquaculture fish species, especially when they are young. The infection subsequently leads to significant economic losses for aquaculture farms. Vaccination is recommended to control this disease. This study describes the efficacy of a live attenuated V. harveyi strain MVh, vhs (LAVh) as a vaccine candidate in controlling infection by wild-type V. harveyi (WTVh) in Lates calcarifer. A total of 240 fingerlings were divided into four groups. Group 1 was not vaccinated and was not challenged; Group 2 was vaccinated with a formalin-killed V. harveyi (FKVh); Group 3 was vaccinated with the LAVh before challenge and Group 4 was not vaccinated and was challenged. Bath vaccination was employed for one hour before the LAVh distribution was determined in the fish mucus. The gills, livers, kidneys and skins were also sampled for gene expression analysis. To challenge the fish, skin abrasion was conducted before the fish were challenged with WTVh. The results revealed an extensive distribution of the LAVh in the liver and kidneys of the fish in Group 3 for the first 12 hr, resulting in mild lesions compared with Group 1. Similarly, there were significantly (p < .05) higher expressions of the Chemokine ligand 4 and major histocompatibility complex I genes in the skin and liver of the fish in Group 3 in comparison with other groups. Vaccination with LAVh resulted in a significantly high rate of survival (68%) of the fingerlings after being challenged with WTVh.

Keywords

KeyWord Plus: IMMUNE-RELATED GENES; DAND-1; R-ERIO; EXPRESSION; ZEBRAFISH; MODULATION; INTESTINE; INFECTION; RESPONSES; BACTERIAL; VACCINES

Author Information

Reprint Address: Ina-Salwany, M. (reprint author)

Addresses:

[1] Univ Putra Malaysia, Inst Biosci, Lab Marine Biotechnol MARSLAB, UPM Serdang 43400, Malaysia
[2] Int Islamic Univ Malaysia, IntInst Halal Res & Training INHART, Kuala Lumpur, Malaysia
[3] Univ Putra Malaysia, Fac Agr, Dept Aquaculture, Serdang, Malaysia

E-mail Addresses: salwany@upm.edu.my

Funding

Funding Agency | Grant Number
--- | ---
Geran Putra Berkumpulan, UPM | 9584102
HICOE | 6309300

Publisher

WILEY, 111 RIVER ST, HOBOKEN 07030-5774, NJ USA
<table>
<thead>
<tr>
<th>Cited References: 49</th>
</tr>
</thead>
<tbody>
<tr>
<td>Showing 30 of 49 View All in Cited References page (from Web of Science Core Collection)</td>
</tr>
</tbody>
</table>

1. **Melano-macrophage centres and their role in fish pathology**
   By: Agius, C; Roberts, RJ
   JOURNAL OF FISH DISEASES Volume: 26 Issue: 9 Pages: 499-509 Published: SEP 2003
   Times Cited: 406

2. **Microbiological quality changes in the intestine of hybrid tilapia (Oreochromis niloticus x Oreochromis aureus) in fresh and frozen storage condition**
   By: Al-Harbi, A. H.; Uddin, M. N.
   LETTERS IN APPLIED MICROBIOLOGY Volume: 40 Issue: 6 Pages: 486-490 Published: JUN 2005
   Times Cited: 11

3. **Vibrio harveyi: a significant pathogen of marine vertebrates and invertebrates**
   By: Austin, B.; Zhang, X-H.
   LETTERS IN APPLIED MICROBIOLOGY Volume: 43 Issue: 2 Pages: 119-124 Published: AUG 2006
   Times Cited: 363

4. **Immunologic considerations for generating memory CD8 T cells through vaccination**
   By: Butler, Noah S.; Nolz, Jeffrey C.; Harty, John T.
   CELLULAR MICROBIOLOGY Volume: 13 Issue: 7 Pages: 925-933 Published: JUL 2011
   Times Cited: 42

5. **Both Major Histocompatibility Complex Class I (MHC-I) and MHC-II Molecules Are Required, while MHC-I Appears To Play a Critical Role in Host Defense against Primary Coxiella burnetii Infection**
   By: Buttrum, Laura; Ledbetter, Lindsey; Cherla, Rama; et al.
   INFECTION AND IMMUNITY Volume: 86 Issue: 4 Article Number: e00602-17 Published: APR 2018
   Times Cited: 4

6. **The Structure of the MHC Class I Molecule of Bony Fishes Provides Insights into the Conserved Nature of the Antigen-Presenting System**
   By: Chen, Zhaosan; Zhang, Nianzhi; Qi, Jianxun; et al.
   JOURNAL OF IMMUNOLOGY Volume: 199 Issue: 10 Pages: 3668-3678 Published: NOV 2017
   Times Cited: 10

7. **Antibiotic alternatives: the substitution of antibiotics in animal husbandry?**
   By: Cheng, Guyue; Hao, Haihong; Xie, Shuyu; et al.
   FRONTIERS IN MICROBIOLOGY Volume: 5 Article Number: 217 Published: MAY 13 2014
   Times Cited: 138

8. **Virulence mechanisms of bacterial aquaculture pathogens and antivirulence therapy for aquaculture**
   By: Defoirdt, Tom
   REVIEWS IN AQUACULTURE Volume: 6 Issue: 2 Pages: 100-114 Published: JUN 2014
   Times Cited: 24

9. **Comprehensive analysis of MHC class II genes in teleost fish genomes reveals dispensability of the peptide-loading DM system in a large part of vertebrates**
   By: Dijkstra, Johannes M.; Grimholt, Unni; Leong, Jong; et al.
   BMC EVOLUTIONARY BIOLOGY Volume: 13 Article Number: 260 Published: NOV 26 2013
   Times Cited: 39

    By: Ding, Chengchao; Fan, Engue; Wang, Shujuan; et al.
    AQUACULTURE Volume: 479 Pages: 311-320 Published: OCT 1 2017
    Times Cited: 7