Molecular characterization and increased expression of the Nile tilapia, *Oreochromis niloticus* (L.), T-cell receptor beta chain in response to *Streptococcus agalactiae* infection

1. N Nithikulworawong
2. A Yakupitiyage
3. SK Rakshit
4. P Srisapoome

Article first published online: 15 MAR 2012

DOI: 10.1111/j.1365-2761.2012.01353.x

© 2012 Blackwell Publishing Ltd

Journal of Fish Diseases


Additional Information

How to Cite


Author Information

1
Aquaculture and Aquatic Resources Management Field of Study, School of Environment, Resource and Development, Asian Institute of Technology, Pathumthani, Thailand

Food Engineering and Bioprocess Technology Program, School of Environment, Resources and Development, Asian Institute of Technology, Pathumthani, Thailand

Department of Aquaculture, Faculty of Fisheries, Kasetsart University, Bangkok, Thailand

*P Srisapoome, Faculty of Fisheries, Kasetsart University, 50 Phahonyothin Road, Chatuchak Bangkok 10900, Thailand (e-mail:ffispssp@ku.ac.th)

Publication History

1. Issue published online: 9 APR 2012
2. Article first published online: 15 MAR 2012
3. Received: 23 October 2010 Revision received: 30 May 2011 Accepted: 3 June 2011

Abstract

The complete cDNA sequence of the Nile tilapia T-cell receptor (TCR) β chain was cloned using 5′ RACE. The full-length, 1263-bp cDNA contained a 942-bp open reading frame (ORF) encoding a 314-amino-acid protein. Sequence analyses revealed that the Nile tilapia TCR β chain contains four conserved cysteine residues involved in the formation of disulphide bridges and a conserved amino acid motif believed to be important for assembly and signalling of the TCR αβ/CD3 complex, both of which are normally found in the TCR β chain of other vertebrates. As detected using semi-quantitative and quantitative RT-PCR, the highest expression level of TCR β was detected in the thymus. Interestingly, Streptococcus agalactiae significantly induced the up-regulation of the TCR β chain, and the strongest up-regulation was detected in the brain and peripheral blood leucocytes (PBLs). In in vitro experiments, concanavalin A and Aeromonas hydrophila were found to significantly increase the expression of the TCR β chain in PBLs after 48 h (P < 0.01) and 72 h (P < 0.05), respectively. Furthermore, real-time PCR analysis showed that intraperitoneal injection (IP) of 10⁷ cfu mL⁻¹ of S. agalactiae could induce TCR β expression that was greater than the expression observed following administration of 10⁹ cfu mL⁻¹. The presence of the TCR β chain in fish detected in this study suggests the presence of T-cell populations that have been found in higher vertebrates, which may play a crucial functional role in the response to fish pathogens.

Keywords: cDNA cloning; expression analysis; Oreochromis niloticus; T-cell receptor beta
