Enhancement of antibody response by LAMP1 chimeric antigen in a DNA vaccine

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ABSTRACT

Immunization by an antigen-encoding DNA (DNA vaccines) has shown promising results in rendering protection against some bacterial and viral diseases in fish. However, some studies showed that DNA vaccines induce variable levels of protection compared with the other types of vaccination. These results are driving the research interest against these infectious diseases to improve the efficacy of DNA vaccines. Recently, chimeric antigens in DNA vaccines have been reported to increase the protection against certain diseases by enhancing specific antibody responses. In this study, we assessed the use of a chimeric DNA vaccine by using lysosome-associated membrane protein-1 (LAMP1) fused with the major capsule protein (MCP) from red seabream iridovirus. First, Japanese flounder (*Paralichthys olivaceus*) LAMP-1 (jfLAMP1) gene was cloned and characterized through tissue distribution and expression analysis. The ORF for jfLAMP1 gene has a length of 1248 bp that encodes for 415 aa (about 44 KDa) and shows highly conserved transmembrane and cytoplasmic domains as those of higher vertebrates. Then, jfLAMP1 was used as a carrier of MCP gene by replacing the intra-lysosomal domain, and subsequent inserting into an expression vector, pCI-neo. In the vaccination trial, juveniles of Japanese flounder were distributed into four groups: pCMCP (MCP in pCI-neo vector), pCLAMP1-MCP (chimeric DNA of jfLAMP1 and MCP in pCI-neo), rMCP (recombinant MCP) and pCI-neo (empty vector as a control). At 30 days post vaccination, blood samples were taken and the serum antibody titers were measured by ELISA. The 3 vaccinated groups showed higher antibody titers than pCI-neo group. The pCLAMP1-MCP vaccinated fish showed antibody levels significantly higher than pCMCP ($p<0.05$). These results will serve as a basis for the use of LAMP1-chimeric DNA vaccines to increase the immune response against certain infectious diseases, for which conventional DNA vaccines show marginal efficacy.

KEYWORDS

DNA vaccination, viral infections, Japanese flounder, antibody response, chimeric gene

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