

**PROTECTIVE EFFICACY OF  
VHSV DNA VACCINATION  
IN RAINBOW TROUT**

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**EXTENDED ABSTRACT ONLY – DO NOT CITE**

Viral haemorrhagic septicaemia (VHS) has severe effects on farmed rainbow trout, resulting in significant losses. Despite efforts over the past two decades using traditional approaches, no successful vaccine has been developed (Lorenzen & Olesen, 1997). DNA vaccination is a potentially successful vaccine strategy whereby protection is induced through administration of pathogen-derived genes into the animal. Good protection is achieved as the DNA vaccine appears to be processed and presented in a similar manner to that of a natural infection (Donnelly *et al.* 1997). To date, DNA vaccination has proved successful in rainbow trout vaccinated against the G (glycoprotein) gene of infectious haematopoietic necrosis virus (IHNV) (Anderson *et al.* 1996) or VHSV (Lorenzen *et al.* 1998). In this study, rainbow trout were vaccinated with

VHS-G DNA vaccine in order to determine how early protection against VHSV could be achieved.

Rainbow trout (mean weight 4.5g; n=150/group) were injected intramuscularly (i.m.) with either 0.5 µg pCDNA3-vhsG or 0.5 µg pCDNA3 in 30 µl Tris/EDTA (TE). Control groups were injected with either TE alone, 2µg inactivated VHSV or left untreated. Fish were challenged by bath at either 1 week, 4 weeks or 8 weeks post vaccination (p.v.) using VHSV virus (Voldbjerg strain;  $1 \times 10^5$  50%  $\text{ml}^{-1}$  TCID<sub>50</sub>). Dead fish were collected daily and cumulative mortalities were calculated over a 4 week period. Blood samples were taken from fish surviving challenge and sera was analysed for neutralizing activity using the 50% PNT test (Olesen & Jorgensen 1986). Mx gene expression was examined in vaccinated, but unchallenged fish (Dr B Collet, University of Aberdeen).

When fish were challenged 1 wk p.v., there was no significant protection in any of the treatment groups (Table 1). Fish receiving the pCDNA3-vhsG vaccine showed a high level of protection when challenged 4 weeks p.v and only 22 % mortalities were recorded. In contrast, mortalities of 86 % or greater were found in all other groups (Table 1). When fish were challenged 8 weeks p.v., a similar result was achieved where mortality amongst DNA-vaccinated fish was 14% but high in all other groups. Vaccination with 2 µg inactivated VHSV failed to provide any protection in fish challenged at either 4 or 8 weeks p.v. (Table 1). No significant mortalities were recorded in vaccinated, unchallenged fish (data not shown).

Table 1. Cumulative mortalities in VHSV DNA vaccinated rainbow trout following challenge at various times post vaccination

Group Treatment	Cumulative mortalities (%) following challenge		
	1 week p.v.*	4 week p.v.	8 week p.v.
0.5 µg pCDNA3- vhsG	60	22	14
0.5 µg pCDNA3 Tris/EDTA	74	98	78
2 µg inactivated VHSV	86	88	96
Untreated	54	86	88
	74	90	92

\*p.v.=post-vaccination

This study demonstrates that VHSV DNA vaccination induces significant protection as early as 4 weeks p.v. with 0.5 µg of DNA. At 8 weeks p.v., doses as low as 0.1 µg DNA is protective (Lorenzen *et al.* 1999). Work is currently in progress to determine if protection correlates with the presence of neutralising antibodies and if a "threshold" level of DNA is required to induce protection at various stages after vaccination.

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