A New Furunculosis Challenge Method for Evaluation of Vaccine Efficacy in Rainbow Trout

Experimental infection of fish for vaccine efficacy studies is associated with several limitations. Administration of live bacteria with the purpose of causing disease in fish can be performed by co-habitation, immersion or injection. We have developed a new Aeromonas salmonicida challenge method for rainbow trout and have applied it for evaluation of furunculosis vaccine efficacy. The method reveals development of systemic immunity in fish as live bacteria are introduced in the tail fin epidermis distant from the vaccine injection site (peritoneal cavity). This method seeks to mimic natural infection in fish farms where tail biting and therefore bacterial exposure to tail ulcers is widespread. By use of a multi-needle device ten epidermal perforations were introduced in the dorsal part of the tail fin of anaesthetized rainbow trout (vaccinated or naive). Subsequently 100 μL (3.4 × 108 colony-forming units (CFU) mL−1) of a 48 hour culture of Aeromonas salmonicida subsp. salmonicida strain 090710-1/23 was placed at the perforation site for 60 sec whereafter fish were allowed to regain consciousness in clean freshwater. Immunohistochemistry and scanning electron microscopy illustrated the spread of bacteria from the injection site. Classical furunculosis symptoms associated with a high morbidity rate were observed in control fish whereas vaccinated fish exhibited a significantly higher survival.

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