

RESOLUTION OF *KUDOA THYRSITES* INFECTION IS ASSOCIATED WITH INFILTRATION OF MHI β ⁺ CELLS IN ATLANTIC SALMON, *SALMO SALAR*

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ABSTRACT

Kudoa thyrsites is a myxozoan parasite of the skeletal muscle in a wide range of fish hosts with a global distribution. In British Columbia, Canada, infections in farmed Atlantic salmon (*Salmo salar*) incur significant economic losses due to post-mortem myoliquefaction. Despite obvious commercial importance, little is known about the life-cycle or host-parasite relationship of *K. thyrsites*. Atlantic salmon can recover from experimental infections and the recovery process is characterized by a gradual loss of plasmodium structure and replacement with fibrous connective tissue. The cellular mechanisms responsible for this process are not known although macrophage-like phagocytes containing mature spores have been observed in chronically infected fish. To address the possibility of protective adaptive immunity in recovered fish, Atlantic salmon were exposed to infective seawater for 500 or 1000 degree-days (DD). The fish were maintained in UV-sterilized seawater and muscle samples were examined histologically at 2000, 3500 and 4312 DD. Previously exposed fish and unexposed controls were exposed to seawater-containing *K. thyrsites* spores, from 4312 to 4812 DD and histological examinations conducted at 6312 DD. Prevalence and severity of *K. thyrsites* declined significantly between 2000 and 4312 DD and there was no statistical difference between the exposure groups. Following re-exposure, the prevalence and severity of infection were significantly lower in previously exposed salmon compared with controls. Significant infiltration of MHI β ⁺ cells was detected in the musculature of infected salmon compared to uninfected salmon. The association of these cells with infected myocytes proceeded in 4 stages: initial contact and envelopment of the myocyte, infiltration of the myocyte, envelopment of the plasmodium and complete degradation of the plasmodium and dissemination of spores by positive cells. While not yet identified, the MHI β ⁺ cells appear to play an important role in the host response to *K. thyrsites*. This study provides evidence for acquired resistance to reinfection of Atlantic salmon with *K. thyrsites*.

KEYWORDS

Kudoa thyrsites, myxozoan, adaptive immunity, *Salmo salar*, immunohistochemistry, host response

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