

Abstract

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Project Title : Francisella-infected tilapia and their susceptibility to *Streptococcus agalactiae* infection

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Abstract : Hybrid red tilapia (*Oreochromis niloticus* × *Oreochromis mossambicus*) were obtained from a commercial farm that had experienced a disease outbreak caused by *Francisella noatunensis* subsp. *orientalis* (*Fno*). This bacterium infects the head-kidney of the fish, an organ involved in haematopoiesis in fish, including the generation of white blood cells that play a defensive role against pathogens. The haemato-immunological functions of the *Fno*-infected red tilapia were therefore tested, including a number of haematological parameters [haematocrit (Hct), total red blood cell (RBC) count, mean corpuscular volume (MCV), total white blood cell (WBC) count, and differential white blood cell count and total plasma protein content], and innate immune parameters such as lysozyme and peroxidase activity and respiratory burst and phagocytic activities of head-kidney macrophages. Most of the parameters examined in the *Fno*-infected fish were comparable to those of normal fish; the percentage of the peripheral lymphocytes was the only parameter found to be significantly lower ($p < 0.05$) than that of the normal fish. Both *Fno*-infected and normal fish were then experimentally challenged with the bacterium *Streptococcus agalactiae*, and the haemato-immunological parameters determined at 3, 6, 12, 24 and 48 h post-infection (hpi). The haematocrit and total RBC count of the *Fno*-infected fish were significantly lower

than those of the normal fish, while the plasma lysozyme, peroxidase and respiratory burst activities of the *Fno*-infected fish was significantly higher than that of the normal fish at many time-points post-challenge. Other parameters were more or less comparable among the groups. Despite normal, or even higher, levels of innate immune activity in the *Fno*-infected fish, they had significantly higher and more rapid onset of mortality than the normal fish following the *S. agalactiae* challenge, while the non-challenged, normal and *Fno*-only-infected fish had 100% survival during the 2-week trial period. The reason for the rapid and high mortality observed in the *Fno*-infected fish when infected with *S. agalactiae* is unknown, but one possibility is that erythropoiesis taking place in the head-kidney is affected by the presence of the *Fno*.

Keywords : *Francisella noatunensis* subsp. *orientalis* (*Fno*), *Streptococcus agalactiae*, red tilapia, immune system