

Gut immune system and the implications of oral-administered immunoprophylaxis in finfish aquaculture

ABSTRACT

The gastrointestinal immune system plays an important role in immune homeostasis regulation. It regulates the symbiotic host-microbiome interactions by training and developing the host's innate and adaptive immunity. This interaction plays a vital role in host defence mechanisms and at the same time, balancing the endogenous perturbations of the host immune homeostasis. The fish gastrointestinal immune system is armed with intricate diffused gut-associated lymphoid tissues (GALTs) that establish tolerance toward the enormous commensal gut microbiome while preserving immune responses against the intrusion of enteric pathogens. A comprehensive understanding of the intestinal immune system is a prerequisite for developing an oral vaccine and immunostimulants in aquaculture, particularly in cultured fish species. In this review, we outline the remarkable features of gut immunity and the essential components of gut-associated lymphoid tissue. The mechanistic principles underlying the antigen absorption and uptake through the intestinal epithelial, and the subsequent immune activation through a series of molecular events are reviewed. The emphasis is on the significance of gut immunity in oral administration of immunoprophylactics, and the different potential adjuvants that circumvent intestinal immune tolerance. Comprehension of the intestinal immune system is pivotal for developing effective fish vaccines that can be delivered orally, which is less labour-intensive and could improve fish health and facilitate disease management in the aquaculture industry.

Keyword: GALT; Gut immunity; Immunostimulants; Immunoprophylaxis; Immune tolerance