

Development of reliable recombinant vaccine against photobacteriosis in gilthead seabream, *Sparus aurata*.

Photobacteriosis or fish pasteurellosis is a severe septicemic disease caused by the gram-negative, halophilic bacterium *Photobacterium damsela* subsp. *piscicida* (*Phdp*) [1]. It is considered one of the most threatening diseases in many warm-water marine fish species in Europe, Asia and North America due to high mortality, and broad host range [2]. *Phdp* outbreaks are often associated with high water temperatures ($>23\text{ }^{\circ}\text{C}$) and poor water quality [3] and lead to mortalities that can be as high as 80% of the affected stock [4]. Research has been focused on the development of effective vaccines to prevent photobacteriosis and limit antibiotic use in fish farming and consequently to reduce economic losses in aquaculture. Conventional *Phdp* vaccines, based on inactivated products containing cellular (heat- or formalin-killed bacteria) and soluble antigens (LPS and ribosomal formulations), appeared to be ineffective in protecting against pasteurellosis and the only commercially available vaccine, an ECP-enriched bacterin preparation, gave unreliable results [1,5,6].

With the emergence of recombinant technology, subunit vaccines have been actively pursued, but mostly for viral diseases. Bacterial subunit vaccines are more difficult to develop since the bacterial genome is more complex, with numerous candidate antigens, leading to a lengthy and laborious screening process. Heat-shock proteins (HSPs) are a family of proteins that are ubiquitous in cellular life. Bacteria produce elevated levels of HSPs as a survival strategy when exposed to stressful environments in a host during infection. This group of proteins are also important antigens that can induce both humoral and cellular immune responses. Previously, several antigenic proteins were identified to develop subunit vaccines against *Phdp*, including rHSP60 which is associated with the expression of higher antibody levels and elicitation of

better protective response than are other proteins [7]. In a more recent study, higher expression levels of immune-related genes and high antibody titres were observed when rHSP33 protein, rather than using rHSP90, rHSP70, and rDnaJ proteins, was used in immunization of Asian seabass (*Lates calcarifer*) [8].

Gilt-head seabream, *Sparus aurata*, is one of the most reared fish in worldwide aquaculture and is highly appreciated as food fish in the area of Arabian Gulf. In this area, *Phdp* is causing severe losses and mortalities up to 50% in the cultured seabream, especially when the fish weight is 50-70 g. Development of a reliable vaccine against *Phdp* infection in gilt-head seabream using recombinant DNA technology is urgently needed, not only in Arabian Gulf area, but also worldwide.

References

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