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TargetFish brings together leading European research groups that are experts on the fish immune system and enterprises from the Biotech and Veterinary sectors that aim to commercialize fish vaccines for European fish farming. By developing a targeted vaccination strategy, TargetFish will prevent important fish diseases in European aquaculture industry.

This highlight is part of monthly progress updates by the TargetFish consortium.

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Reviewing the role of Toll-like recognition receptors in fish

As mentioned in previous newsletters, Toll-Like receptors (TLRs) play an important role in innate immune mechanisms that form the first line of defense against many invading pathogens. TLRs are an important group of receptors recognizing conserved motifs commonly present on/in important groups of pathogens. Recognition of these motifs by TLRs not only activates the innate immune system but also activates pathways important for acquired immunity. Like other vertebrate TLRs, the Toll-like receptors of finfish can be subdivided into six major families, each of which recognize a general but different class of pathogen-associated motifs from (Gram negative/positive) bacteria, (DNA/RNA) viruses and (protozoan/metazoan) parasites.

		Up	Down	No change
B a c t e r i a		<i>L.crocea</i>	TLR1, 3 ¹	TLR2, 22 ¹
	<i>A.hydrophila</i>	<i>S.aurata</i>	TLR2 ²	
	<i>A.salmonicida</i>	<i>S.salar</i>	TLR5 ³	TLR1, 3, 5, 20 ⁴
	<i>E.tarda</i>	<i>D.erio</i>	TLR2, 4, 5 ⁵	
	<i>F.psychrophilum</i>	<i>O.mykiss</i>		TLR2, 3, 5, 9, 22 ⁶
	<i>S.typhimurium</i>	<i>D.erio</i>	TLR5 ⁷	TLR8, 18 ⁸
	<i>V.harveyi</i>	<i>L.japonicus</i>		TLR1, 3, 18 ⁸
	<i>M.marinum</i>	<i>D.erio</i>	TLR5, 21 ⁹	

Although most TLRs are present in all fish families, including, cyprinids (carp), salmonids (salmon, trout), perciforms (sea bass, bream) and flatfishes (turbot), also clear differences between fish families exist. Low conservation generally hinders predictions of the exact specificities of the recognition domains of TLRs. The differences between families require that recognition of pathogen-associated motifs of the various TLRs are studied in more detail, per fish family.

Researchers from the Cell Biology and Immunology group at Wageningen University, The Netherlands have reviewed the presence of TLRs in different fish species. They summarized studies into changes in TLR gene expression profiles as result of bacterial, or viral infection. The application of PCR and availability of increasing numbers of fish genomes has led to numerous gene expression studies, and induced changes of gene expression may provide (in)direct evidence for the involvement of a particular TLR in the recognition of a pathogen. Especially when findings are consistent across different studies and/or across different fish species, up-regulation of TLR gene expression could be a first indication of functional relevance.

From a practical viewpoint it is important to realize that TLRs are a receptor family considered extremely important for recognition of pathogens and building up of innate immunity. Further, TLRs are considered crucial modulators of protective immunity co-induced by adjuvants, normally present in many fish vaccines. Up-regulation of TLR gene expression can serve as a first indication of functional relevance, but requires confirmation of function.

[Read the full article](#)

TargetFish 2nd Industry Workshop

The 2nd TargetFish Industry Workshop held during the 17th International Conference of the European Association of Fish Pathologists (EAFP) in Gran Canaria, Las Palmas in September 2015, where TargetFish highlights and achievements were discussed, was a great success. The significance of these developments for the aquatic animal health industry and how they may be taken forward into commercial applications were discussed with representatives from both, Academia and Industry. A Workshop Report has just been published in the Bulletin of the European Association of Fish Pathologist [Volume 36 \(1\), 2016, page 52-55](#)



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