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TargetFish Newsflash 3

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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Immune cells in the digestive tract of rainbow trout contribute to mucosal immunity

Intestinal immunity remains a bit of an enigma in fish. Although white blood cells are present all along the digestive tract, most studies have focused on the posterior part and ignored the potential importance in terms of immunity of each separate gut segment. Researchers from Centro de Investigación en Sanidad Animal (CISA-INIA) in Spain, part of the TargetFish consortium, have now studied the regulation of several immune genes along five segments of the rainbow trout digestive tract. In their study (2014: *Dev Comp Immunol.* 44: pages 195-205), they compared responses to infection with infectious pancreatic necrosis virus (IPNV) with those induced by oral vaccination.

Although the structures and segments present in the digestive tract show significant differences among the diverse teleost species, there is a clear general division into three main segments. In the first segment or foregut, including the esophagus and stomach, food protein is taken up. The second segment, including the midgut and in salmonids, a variable number of pyloric caeca, is characterized by a strong uptake of macromolecules. The third segment or hindgut,

including the anus, is thought to have an osmorregulatory function.

In their analysis, the researchers concentrated on measuring gene expression of a series of important immune genes, including important messenger molecules such as mucosal chemokines and chemokine receptors. Clearly, there is a differential regulation of these immune genes in response to the different stimuli along the different gut segments. The results suggest on one hand that the capacity of the different segments to recruit leukocytes is different; and on the other hand, that the virus and the vaccine trigger different immune mechanisms. Of interest is that IPNV provoked a mobilization of B lymphocytes to the foregut and pyloric caeca region, whereas T lymphocytes seemed to have a preference for the pyloric caeca and midgut/hindgut regions. No matter what, the results contribute to a better understanding of how mucosal immunity is orchestrated in the different gut segments of fish.



From a practical viewpoint, these findings will provide us with a deeper understanding of the mucosal immune response of fish and subsequently help to achieve the, until now, elusive goal of effective orally-delivered vaccines for fish. Effective oral vaccines for fish have been eagerly sought after since the pioneering work of Duff nearly 60 years ago and they have become the 'Holy Grail' of the fish vaccinologist. It is hoped that these studies will help achieve this elusive goal.

Effective oral vaccines will enable fish to be vaccinated without the stressful and potentially damaging handling associated with immersion and/or injection vaccination. Furthermore, it will allow vaccination to take place on farm sites which are difficult to access e.g exposed cage sites or more -extensive farm sites. Oral vaccines can also provide the possibility of booster vaccines to strengthen the immunity and duration of immunity and can be used to develop targeted vaccination strategies.

TargetFish 2nd Industry Workshop

Following the great success of the 1st TargetFish Industry Workshop held during the 16th International Conference of the European Association of Fish Pathologists (EAFP) in

Tampere, Finland in September 2013 a second Workshop is planned for the 17th EAFP Conference in Gran Canaria, Spain in September 2015.

The 1st Industrial Workshop was held relatively close to the commencement of the TargetFish project and basically covered the content of the various Work Packages. Two years on most of the Work Packages have now achieved a number of significant discoveries relevant to the aquatic animal health industry. These findings will be described during the Industry Workshop and an opportunity for the researchers and industry partners to meet and discuss the significance and application of these findings on the development of new vaccines, vaccination techniques/strategies, treatments and diagnostics and how they may be taken forward into commercial applications.

For more information, please please visit www.targetfish.eu or contact the consortium via targetfish.cbi@wur.nl



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TargetFish is a large collaborative project funded by the European Commission (Grant Agreement No. 311993) under the 7th Framework Programme for Research and Technological Development.



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