

Allergenic activity of Anisakidae, fishborne parasites

Saelens Ganna¹, Planckaert Sören², Martínez-Sernández Victoria³, Gabriël Sarah⁴, Ubeira Florencio³ and Devreese Bart^{2,4}

¹ Laboratory of Foodborne Parasites, Department of Veterinary Public Health and Food Safety, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium
E-mail: ganna.saelens@ugent.be

² Department of Biochemistry and Microbiology, Ghent University, K.L. Ledeganckstraat 35, 9000 Gent, Belgium

³ Department of Microbiology and Parasitology, Instituto de Investigación en Análisis Químicos y Biológicos, Rúa Lope Gómez de Marzoa, s/n. Campus Vida. 15782 Santiago de Compostela, Spain

⁴ Department of Veterinary Public Health and Food Safety, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium

The presence of parasites in marine fish poses a serious problem for the fishing industry in many countries worldwide. The family Anisakidae, mainly represented by the species *Anisakis simplex* and *Pseudoterranova decipiens*, are nematodes infecting the muscles and gastrointestinal tract of a wide range of marine fish species and can induce severe pathologies in humans. First, both are causative agents for acute gastrointestinal disease in humans after ingestion of a live larva by consumption of raw or undercooked fish. Secondly, in the case of *A. simplex*, human health may be compromised by an allergic reaction against its proteins after consuming or even handling infected fish. Besides being highly resistant to heating and freezing, some of the allergens are excretory-secretory (ES) products. As such, people may be exposed to them not only through the direct ingestion of a larva, but also when the larva was removed during the processing of the fish leaving these ES-allergens behind (Adroher-Auroux & Benítez-Rodríguez, 2020). Limited information on *P. decipiens* allergenicity is available, however, due to its phylogenetic relatedness with *A. simplex* and a high degree of homology of its proteins with *A. simplex* allergens, *P. decipiens* might also have an allergic potential (Kochanowski *et al.*, 2020). Therefore, the aim of this work was to confirm whether or not one or more *A. simplex* allergen(s) were also to be found in *P. decipiens*. This was studied by subjecting extracts of crushed whole *P. decipiens* larvae as well as *P. decipiens* ES-extracts to two different *A. simplex* allergen detection techniques. Specifically, 55 *P. decipiens* larvae were excised from highly infected fresh codfish obtained from a Belgian fish distributor. Fifty of them were cultivated in a nutrient rich medium to obtain an extract of ES proteins, while another five larvae were crushed to obtain whole crude *P. decipiens* proteins. Both extracts were subsequently subjected to an immune-mediated detection technique (an enzyme-linked immunosorbent assay; ELISA) based on the recognition of an antibody against one specific *A. simplex* allergen (Ani s 7). Additionally, both extracts were inserted into a mass analyser (tandem mass spectrometry) used for the detection and identification of proteins and their fragments. In both detection tools, crude and ES *A. simplex* extracts were used as positive controls. The results of the ELISA confirmed the presence of one *A. simplex* allergen (Ani s 7) in both *P. decipiens* extracts. Moreover, using tandem mass spectrometry, six and two *A. simplex* allergens respectively were detected in both ES and crude *P. decipiens* extracts. This work confirms that not only *A. simplex*, but also *P. decipiens*, should be considered a potential source of allergens that could lead to severe hypersensitivity in humans. Future work entails clinical studies investigating the actual allergenic potential of *P. decipiens* in humans.

References

- Adroher-Auroux, F.J., & Benítez-Rodríguez, R. (2020). Anisakiasis and Anisakis: An underdiagnosed emerging disease and its main etiological agents. *Research in Veterinary Science*, 132, 535-545. doi:10.1016/j.rvsc.2020.08.003
- Kochanowski, M., Dąbrowska, J., Różycki, M., Karamon, J., Sroka, J., & Cencek, T. (2020). Proteomic Profiling Reveals New Insights into the Allergomes of *Anisakis simplex*, *Pseudoterranova decipiens*, and *Contracaecum osculatum*. *J Parasitol*, 106(5), 572-588. doi:10.1645/19-75

Keywords: Fish parasites; Food safety; Allergens; Detection