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Genetic Diversity of *Listeria monocytogenes* From the Fish Industry in The Western Cape, South Africa Using Whole Genome Sequencing

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Abstract

Several outbreaks have been reported worldwide linked to fish products including smoked trout, smoked salmon, smoked mussels, raw fish, and molluscan shellfish. *Listeria monocytogenes* is a problem in fish and the fish food processing environment (FPE). However, there is limited information in South Africa regarding *L. monocytogenes* from fish products.

The aim of this study was to investigate the genetic diversity of *L. monocytogenes* isolated from fish products and the fish FPE in Western Cape, South Africa.

Forty-two (N=42) *L. monocytogenes* isolates from fish products (n=34) (salmon, smoked trout, fresh hake, oysters) and clinical *L. monocytogenes* isolates (n=8) were included in this study. *L. monocytogenes* were isolated using culture-based methods (RAPID'L.Mono™ Chromogenic Media and 2% blood agar (for purity)), screened for the virulent hly gene by PCR, and categorised into lineage groups using PCR-RFLP. A subset of twenty isolates (n=12 from fish products and n=8 from clinical origin) were processed by WGS using Illumina technology and data files were analysed for serotype and sequence type (ST) information.

The isolates from fish products examined belonged to two lineage groups and three serogroups. Lineage I (n=4) with serogroups 1/2b (ST87) and 4b (ST54 and ST515) were identified. And lineage II (n=8) consisted of serogroup 1/2a (ST121, ST204 and ST155). All clinical isolates belonged to serogroup 4b with ST1 (n=1) and ST876 (n=7).

The serogroups (1/2a, 1/2b and 4b) isolated in this study are linked to the majority of human listeriosis cases with an increase of listeriosis cases linked to serogroup 1/2a during the last decade in many developed countries, and serogroup 4b is typically associated with listeriosis outbreaks. All ST's, except ST515 isolated in this study have been associated with clinical cases around the world. The results are concerning as many of these fish products are ready-to-eat, and with no or improper heat treatment and the ability of *L. monocytogenes* to survive and grow in refrigeration temperatures, it can pose a significant risk to the health of consumers. Therefore, it highlights the risk associated with these foods to immune suppressed individuals and insight to possible contamination sources that should be investigated further.