



POSTER

INVESTIGATION OF A FOODBORNE LISTERIOSIS CASE: THE CONTRIBUTION OF OFFICIAL FOOD CONTROLS AND WHOLE GENOME SEQUENCING

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In 2023, a fatal case of foodborne listeriosis associated with the consumption of ready-to-eat meat products occurred in the Marche Region (Italy). The aim of this study was to describe how an integrated epidemiological investigation, official food controls, and whole genome sequencing (WGS) enabled source attribution despite the absence of initial food traceability.

Following notification of a case of invasive listeriosis, with *Listeria monocytogenes* (Lm) isolated from the patient's blood culture, the Hygiene and Public Health Service conducted an epidemiological investigation using the standardized questionnaire required by the regional guidelines for the management of foodborne diseases. In the Marche Region, laboratory surveillance for listeriosis includes routine WGS of all clinical Lm isolates; therefore, the clinical isolate underwent genomic characterization at the regional reference laboratory. WGS data were compared with clinical, food, and environmental isolates included in the surveillance system. Subsequently, the Animal-Based Food Hygiene Service (ABFHS) carried out an inspection at the patient's residence, collecting 10 food samples (04 meat products: ham, coppa, ciauscolo, and porchetta-style turkey roast; 02 dairy products: soft cheese and grated cheese) and 10 environmental swabs (05 from food-contact surfaces and 05 from non-food-contact surfaces). Samples were analysed by the Istituto Zooprofilattico Sperimentale Umbria e Marche for the presence of Lm, and the isolates were serogrouped by polymerase chain reaction (PCR). Isolates belonging to the same serogroup (IIA) as the clinical strain were subsequently sent to the National Reference Laboratory for *Listeria* (Istituto Zooprofilattico Sperimentale Abruzzo

e Molise) for WGS and further genomic characterization. Because the food producer could not initially be identified, official sampling activities and WGS surveillance continued throughout 2024 in meat-processing establishments approved under Regulation (EC) No. 853/2004.

Lm was isolated from 02 ready-to-eat pork products (ciauscolo and coppa di testa) collected from the patient's refrigerator, whereas all environmental swabs tested negative. WGS demonstrated that both food isolates were genomically related to the human isolate, confirming the epidemiological link. Subsequently, in 2024 official controls detected Lm in a sample of coppa di testa collected from a local meat-processing establishment. Genomic analysis confirmed that this isolate belonged to the same genomic cluster as the clinical isolate and the contaminated food recovered from the patient's home, allowing identification of the production facility as the most likely source of infection. Detection of Lm in the product collected at the establishment prompted the ABFHS to initiate judicial police proceedings against the person responsible for the company, in accordance with Articles 12-ter and subsequent provisions of Law No. 283/1962, as amended. Once the link with the human case had been established, the Service submitted a report to the Public Prosecutor's Office for further action.

This investigation demonstrated that combining epidemiological evidence with WGS substantially improved source attribution in a sporadic case of foodborne listeriosis, even in the absence of conventional food traceability. The findings highlight the value of coordinated action among public health services, veterinary authorities and reference laboratories in identifying the source of infection, supporting risk management, and strengthening food safety.