

# NEWSLETTER

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August 2025

Event on Impact of Employment Equity Amendment Act 2025

See page 2



One Health in action: advancing food safety through microbiological analysis, whole genome sequencing and antimicrobial resistance surveillance

By Cristina Caiado Rocha

See page 17



Lifetime Achievement Off the Track – Bucket List Dream Comes True for Mimi Jardim

See page 7



Celina dos Santos Sequeira: Breaking Barriers in Creative Media

By Ricardo de Freitas

See page 20



Unveiling the Strategic Pillars of Business Success

By Ivone da Silva

See page 11



Tribute: Mark Joseph Peters (MJP) - Networker extraordinaire, friend and collaborator of the SAPCC

By Tony de Gouveia

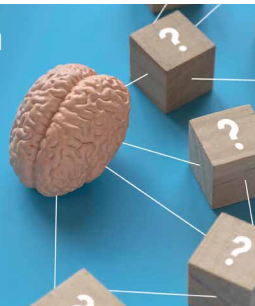
See page 23



The Brain and the Bottom Line: Can Understanding Human Behaviour Improve Your Business?

By Natércia Faustino

See page 14



Portos 5+ traz nova visão a 10 anos

See page 25



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# One Health in action: advancing food safety through microbiological analysis, whole genome sequencing and antimicrobial resistance surveillance

By Cristina Caiado Rocha\*



Cristina Caiado Rocha

In today's interconnected world, the One Health approach has proven indispensable in safeguarding the food chain against emerging threats. This integrated model brings together the human, animal and environmental health sectors, promoting a robust defense against foodborne diseases. This collaborative and integrative approach encompasses

the prevention and control of infectious diseases, epidemiological surveillance, environmental health and health promotion in all its aspects.

Let's go back to 2017 when an outbreak of listeriosis associated with processed meat occurred in South Africa. An increase in the number of cases of listeriosis at two

public hospitals in Gauteng Province, South Africa, during July and August 2017 prompted an investigation. Case numbers rapidly increased nationwide. A total of 937 cases were reported during the outbreak period, with a case-fatality ratio of almost 30%. Whole Genome multilocus Sequence typing of *Listeria monocytogenes* isolates from patients identified a single sequence type (sequence type 6 [ST6]) in 93% of the cases. The Whole-genome sequencing (WGS) and intensive epidemiologic and trace-back investigations were used to pursue the source of the outbreak. Health authorities initiated the collection of food samples from the homes of patients in mid-November 2017. When *L. monocytogenes* was isolated from a food sample, a trace-back investigation was conducted. The number of cases decreased dramatically after recall of the implicated products on March 4, 2018. The Minister of Health announced the outbreak source. Facility A products were traced and recalled from distributors and retailers, and the public was advised to return products for reimbursement. Facility A was closed immediately. The World Health Organization assisted in recalling the products that had been exported to 15 African countries (Angola, Botswana, Democratic Republic of

\*Thomas, J., Govender, N., McCarthy, K. M., Erasmus, L. K., Doyle, T. J., Allam, M., Ismail, A., Ramalwa, N., Sekwadi, P., Ntshoe, G., Shonhiwa, A., Essel, V., Tau, N., Smouse, S., Ngomane, H. M., Disenyeng, B., Page, N. A., Govender, N. P., Duse, A. G., Stewart, R., ... Blumberg, L. H. (2020). Outbreak of Listeriosis in South Africa Associated with Processed Meat. *The New England journal of medicine*, 382(7), 632–643. <https://doi.org/10.1056/NEJMoa1907462>.

Congo, Ghana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Nigeria, eSwatini, Uganda, Zambia, and Zimbabwe). A single case of listeriosis was reported in Namibia during March 2018, but the patient's isolate was confirmed as non-ST6; no other countries reported cases during the period from January 1, 2017, to September 3, 2018, when the outbreak was declared over.

As global challenges intensify – whether it be global warming or the evolution of pathogens – microbiological analysis and cutting-edge genomics, such as whole genome sequencing, are becoming increasingly important.

The latest report by the European Food Safety Authority (EFSA) in conjunction with the European Centre for Disease Prevention and Control (ECDC) identified campylobacteriosis and salmonellosis as the main foodborne diseases with the greatest impact on public health, closely followed by yersiniosis, infections caused by Shiga toxin-producing *Escherichia coli* (STEC) and listeriosis. Each of these diseases, resulting from the consumption of contaminated food, represents a significant burden on health systems across Europe. Detecting the source of these infections early allows for rapid responses to be implemented, reducing the number of hospitalisations and fatalities, and ensuring corrections and/or corrective actions so that the entire food chain remains safe.

Whole Genome Sequencing (WGS) has revolutionised the way outbreaks are investigated. By analysing the complete genetic blueprint of pathogens, WGS enables accurate matching between clinical isolates and isolates from food, animal and environmental sources. This level of accuracy not only confirms the source of an outbreak, but also helps to monitor its possible spread. When pathogens are directly linked to isolates related to specific sources or distribution chains, public health officials can intervene more quickly and effectively, minimising the impact on consumers and the economic consequences of possible withdrawal (if they are still under the immediate control of the food business operator) or mass recall of food products (when they are already available on the market).

Food safety has been reinforced by the provisions of European Commission Implementing Regulation (EU) 2025/179, enacted on 31 January 2025 and applicable from 23 August 2026. This regulation establishes a standardised framework for the collection and transmission of molecular analytical data during epidemiological investigations of foodborne outbreaks. It requires the competent authorities of Member States to integrate WGS data into their surveillance systems. This harmonisation ensures that, in the event of scattered national outbreaks or outbreaks involving several countries, data is available and shared seamlessly between laboratories, health authorities and food safety authorities, speeding up the identification of clusters and the implementation of more effective control measures, coordinated between the different entities involved.

Another crucial aspect of this discussion is the resistance of microorganisms to antimicrobials (Antimicrobial Resistance - AMR), a challenge intrinsically linked to food safety. From a One Health perspective, AMR is not only considered a clinical obstacle, but also a complex cross-sectoral issue. The overuse of antibiotics has paved the way for the emergence of resistant strains.

These strains, when transmitted through the food chain, hinder treatment and increase risks to populations – a problem that not only affects human and animal health, but also poses a significant risk to public health within the One Health approach. Current surveillance systems – which combine traditional microbiological analyses with advanced WGS data – enable more effective monitoring of antimicrobial resistance. This integrative effort not only contributes to effective responses in outbreak situations and improved food safety management systems, but also guides legislative policy decisions to achieve acceptable levels of population protection.

The convergence of microbiological culture techniques with advanced molecular techniques, genomic and metagenomic analysis, and a unified regulatory framework is laying the foundations for a safer and more resilient food supply. As we face challenges arising from foodborne diseases, all eyes are on the One Health approach. It is through this perspective that scientists, public health and food safety experts, and policymakers are redefining food safety for the future, where early detection, rapid response, and proactive surveillance form the cornerstone of public health protection.

**\*About the Author:** \*Cristina Caiado Rocha, holds a Master's degree in Food Engineering, along with postgraduate qualifications in Quality Engineering and One Health. Her international experience includes living in several countries, notably South Africa, which has enriched her global perspective on public health and food safety. She currently serves as a Senior Technician at the Microbiology Laboratory – Reference Unit, within the Food and Nutrition Department of the National Health Institute in Porto, Portugal.



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