A MassARRAY Assay for Rapid Identification and Serotyping of Foodborne and Zoonotic Pathogens to Strengthen Food Safety

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ASTRACT:
MassARRAY is a highly sensitive DNA-based analysis platform that employs MALDI-TOF mass spectrometry to detect genetic variations with high accuracy. The workflow combines PCR amplification with a single-base extension reaction, followed by MALDI-TOF MS analysis of allele-specific products. This high-throughput, multiplexed approach enables efficient detection of multiple targets in a single assay, offering rapid pathogen identification with significant cost-effectiveness.

Applied to food safety, a MassARRAY assay was developed and validated for the rapid detection of bacterial foodborne pathogens at both species and serotype levels. The assay targets key foodborne pathogens, including *Campylobacter coli*, *Campylobacter jejuni*, *Clostridium perfringens*, *Escherichia coli*, *Enterococcus faecalis*, *Enterococcus faecium*, *Listeria monocytogenes*, *Salmonella spp.*, *Shigella spp.*, and *Staphylococcus aureus*. It has also been adapted for the serotyping of *Salmonella*, providing accurate discrimination of epidemiologically important serotypes including *S. Typhimurium*, *S. Enteritidis*, and *S. Kentucky*. Beyond classical foodborne pathogens, the technology has further potential for the serotyping of zoonotic bacteria such as *Streptococcus suis*, a pathogen of increasing concern in both veterinary and public health.

By combining high sensitivity, scalability, and multiplexing capacity into a single assay, MassARRAY has the potential to transform food safety monitoring. Its robust performance and adaptability make it a powerful tool for improving detection accuracy, accelerating response times, and supporting compliance with global food safety standards.