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Application News

Microchip Electrophoresis No.B22

Detection of Food Poisoning-Related Genes with MCE-202 MultiNA

In recent years, genetic detection methods have become widely adopted for the identification of the causative agents of food poisoning, allergies, and infectious diseases such as influenza.
The most widespread conventional gene-level detection method involves amplification of specific genes using PCR (Polymerase Chain Reaction), followed by detection of the amplification products and sizes using electrophoresis.
The conventional agarose gel electrophoresis technique is a labor-intensive series of processes from preparation of the gel to obtaining results. Furthermore, size measurement involves visual comparison with the sizes of known bands, which often leads to variation in results due to the reliance on individual objectivity.
Here we introduce the analysis of genes related to food poisoning using the MCE-202 MultiNA Microchip Electrophoresis System for DNA/RNA Analysis. This system offers high-speed, automated analysis, higher detection sensitivity than agarose gel electrophoresis, and automatically calculated size estimation using pretreatment and electrophoretic parallel processing.

■ Food Poisoning-Related Genes

Here, the 10 types of genes related to food poisoning shown in Table 1 were selected as targets.

Table 1 Food Poisoning-Related Genes

Thermostable direct hemolysin-related hemolysin (*trh* 1&2) gene of *Vibro parahaemolyticus*
Staphylococcus aureus enterotoxin A gene
Staphylococcus aureus toxic shock syndrome toxin-1 gene
*inv*A gene of *Salmonella* sp.
LT gene of enterotoxigenic *E. coli*
STh gene of enterotoxigenic *E. coli*
STp gene of enterotoxigenic *E. coli*
VT1 genes of enterohemorrhagic *E. coli*
VT2 genes of enterohemorrhagic *E. coli*
VT genes of enterohemorrhagic *E. coli*

Table 2 Analytical Conditions

(For PCR)	
Reagent Kit	: Ampdirect® Plus Enzyme Set Shimadzu P/N: 241-08890-92
(For MultiNA)	
Instrument	: MCE-202 "MultiNA"
Analysis Mode	: DNA-500 on-chip mode
Reagent Kits	: DNA-500 Kit Shimadzu P/N: 292-27910-91 SYBR® Gold nucleic acid gel stain Invitrogen S-11494 25bp DNA Ladder Invitrogen 10597-011

■ Experimental Procedure

The samples consisted of DNA extracted from the respective strains, and refined.
PCR was conducted using Shimadzu's Ampdirect® Plus gene amplification reagents, and the obtained PCR amplification products were analyzed using the MultiNA (Fig. 1).
Table 2 lists the conditions, including instrument and reagents, used for the analysis.

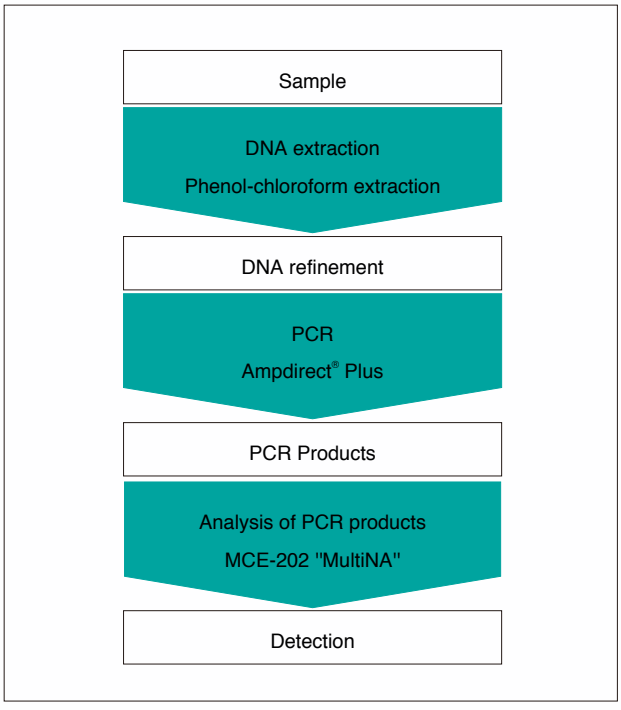

Fig. 1 Experimental Procedure of Food Poisoning-Related Genes

■ Detection of Food Poisoning-Related Genes

The results of analysis of the target region for the 10 types of genes related to food poisoning based on the procedure of Fig. 1 are shown in Fig. 2.
All of the food poisoning-related genes and the targeted regions were detected.
The results of analysis using the MCE-202 MultiNA were obtained as electrophoretic images and electropherograms. The estimated size and concentration values for the amplification products were calculated from the calibration curve for the standard sample (ladder) and expressed as numeric values, allowing simple and reliable evaluation of the target amplification products.

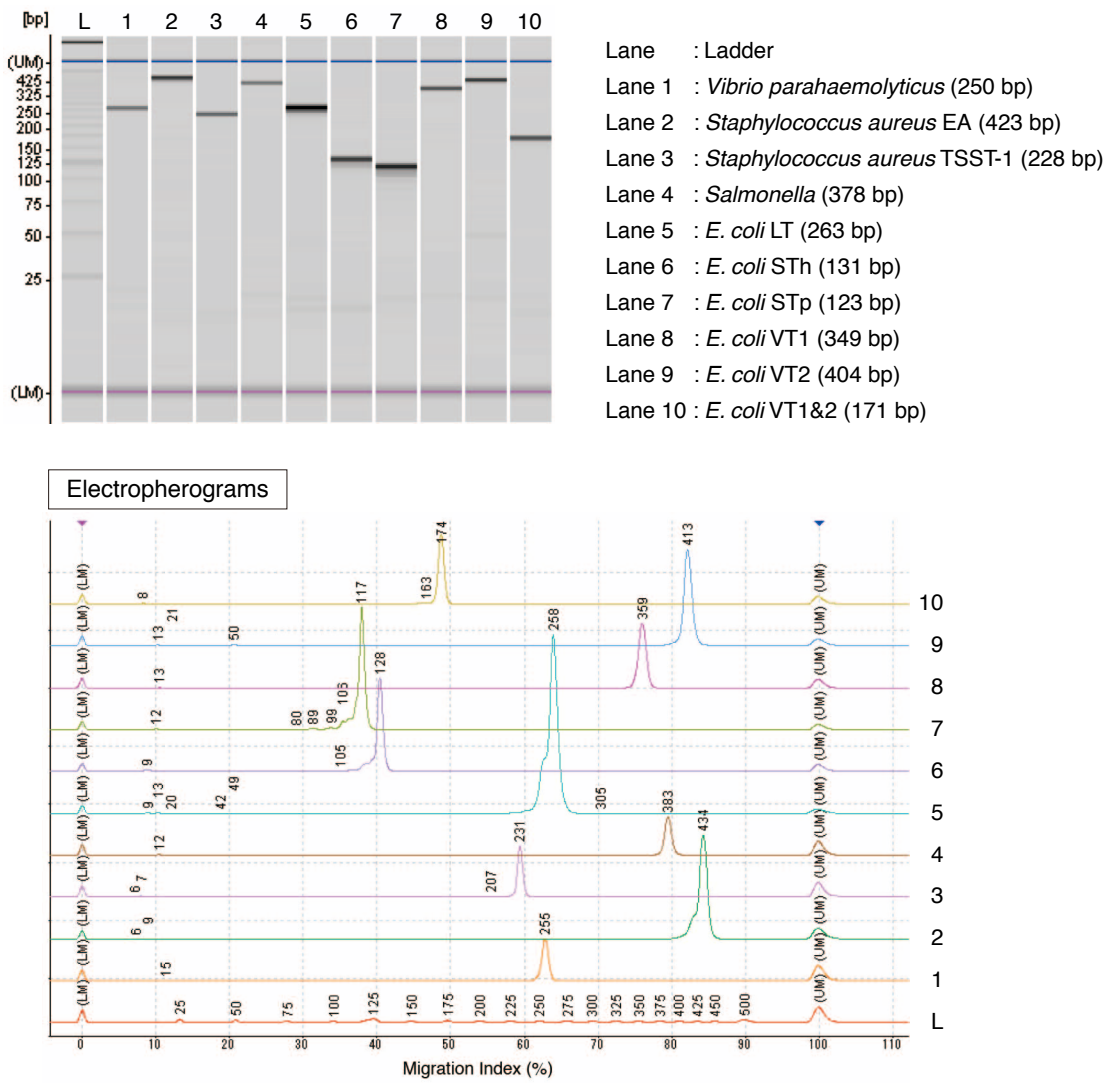

Fig. 2 Analytical Results of Food Poisoning-Related Genes

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