[S10-5]

Microbial Detection and Identification Using Biosensors

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Abstract

Various biosensors were evaluated for identifying and detecting foodborne pathogens in a rapid and effective manner. First, five strains of *Escherichia coli* and six strains of *Salmonella* were identified using Fourier transform infrared spectroscopy and a statistical program. For doing this, lipopolysaccharides (LPSs) and outer membrane proteins (OMPs) were extracted from a cell wall of each bacterial strain. As a result, each strain was identifed at the level of 97% for *E. coli* and 100% for *Salmonella*. Second, *E. coli* O157:H7, *S.* Enteritidis, and *Listeria monocytogenes* were identified by multiplex PCR products from four specific genes of each bacteria using a capillary electrophoresis (CE). Also, ground beef for *E. coli* O157:H7, lettuce for *S.* Enteritidis, and hot dog for *L. monocytogenes* were used to determine the possibility of detecting pathogens in foods. Foods inoculated with respective pathogen were cultivated for six hours and multiplex PCR products were obtained and assessed. The minimum detection levels of tested bacteria were <10 cells/g, <10 cells/g, and 10^4 cells/g for *E. coli* O157:H7, *S.* Enteritidis, and *L. monocytogenes*, respectively. Third, it was possible to detect *S.* Typhimurium in a pure culture and lettuce by a bioluminescence-based detection assay using both recombinant bacteriophage P22::*luxI* and a bioluminescent bioreporter. In addition, bacteriophage T4 was quantitatively monitored using *E. coli* including *luxCDABE* genes.