Rapid microwave-based lysing and PCR detection of Listeria monocytogenes and Vibrio cholera

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The Lyse-It® technology is a new method for the rapid cellular lysing, DNA fragmentation, and protein degradation for pathogenic bacteria. The current bottleneck to pathogen detection is the sample preparation. Current methods involve many reagents, various steps and protocols, and can be time consuming. The Lyse-It® technology allows for one to two step bacteria preparation followed by rapid microwave irradiation of the sample. Following microwave irritation, the sample is purified, and the bacteria can be detected on platforms such as Polymerase Chain Reaction (PCR) and Microwave-Accelerated Metal-Enhanced Fluorescence (MAMEF). The Lyse-It® technology is employed on Listeria monocytogenes and Vibrio cholerae. Analysis of cellular lysis was performed via Dynamic Light Scattering (DLS), protein degradation by Sodium Dodecylsulfate Gel Electrophoresis (SDS PAGE), and DNA fragmentation by ethidium bromide stained gel electrophoresis. It was found that DNA fragmentation occurs down to below 500 base pairs, which is optimal for PCR and MAMEF. More protein degradation is seen with the Lyse-It® technology as compared to conventional methods like water bath heating. Dynamic Light Scattering verified that the bacterial cells are being broken down in to smaller components by analysis of the Z-Average.

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