B163 MicroFLOQ®: Collection and Direct Amplification Methods Using the GlobalFiler™ Kit for DNA Recovered From Common Pipe Bomb Components

Esiri Tasker, BA, Sam Houston State University, Huntsville, TX 77340-6685; Carrie Mayes, BS, Sam Houston State University, Huntsville, TX 77340; Sheree R. Hughes-Stamm, PhD, Sam Houston State University, Huntsville, TX 77340*

Learning Overview: The goal of this presentation is to demonstrate that direct amplification using microFLOQ® swabs can be more informative compared to traditional DNA processing by providing more complete STR profiles from challenging, low-quality "touch" DNA samples from common pipe bomb components.

Impact on the Forensic Science Community: This presentation will impact the forensic community by demonstrating how using microFLOQ® swabs and direct amplification can be advantageous when processing "touch" DNA samples.

Improvised explosive devices (IEDs) such as pipe bombs are often used to cause fear and devastation within communities. When attempting to analyze DNA from recovered pipe bomb fragments, quantities are often limited which can make DNA typing extremely difficult. Amplifying trace amounts of DNA can cause stochastic effects. Effects such as peak height imbalance, allele and/or locus dropout, and failed amplification can render a profile uninterpretable and result in lost investigative leads. Therefore, the efficiency of the initial collection of DNA from challenging items of evidence is important to maximize the amount of DNA available for downstream analysis.

Alternate methods may be better suited for processing “touch” and other challenging DNA samples. Direct amplification bypasses the extraction and quantification steps by placing the collected sample directly into the PCR reaction. This reduces DNA loss, increases the amount of starting template available for amplification, and increases the likelihood of generating more complete profiles. However, direct amplification kits and protocols typically target high molecular weight DNA and are intended to be used for reference samples.

The aim of this study was to optimize the recovery of mock “touch” DNA from common pipe bomb substrates by exploring two swab types (cotton and microFLOQ®) and various direct amplification methods. An epithelial cell suspension (~30 cells or 200 pg DNA) was spiked onto four different pipe bomb substrates (PVC pipe, galvanized steel pipe, electrical tape, and insulated copper wire), and swabbed with either cotton or microFLOQ® swabs. microFLOQ® swabs were placed directly into the PCR reaction for amplification or incubated for 20 minutes at room temperature in 40 µL of TE prior to direct PCR. Cotton swabs were either extracted using the PrepFiler *Express*™ kit on the Automate *Express*™, amplified directly using the GlobalFiler™ PCR Amplification kit, or incubated in 400 µL of TE for 20 minutes prior to amplification.

The results from this study showed that direct amplification of the microFLOQ® swabs resulted in the most complete profiles when amplified directly. The data further support the notion that traditional DNA processing may not be the most suitable method for processing “touch” and low-template DNA samples for STR analysis. In addition, direct amplification with microFLOQ® required the least number of steps, which reduced processing time and decreased the risk of contamination.

MicroFLOQ®, Pipe Bomb, Direct Amplification