Abstract

In 1998 Mark Dallagher became the first person in the United Kingdom to be convicted of a crime based on earprint evidence. He was sentenced to life imprisonment for murder. The only evidence presented at trial was four earprints found on a window pane at the crime scene, which were stated to be a match to a sample provided by Mark Dallagher. In 2004 an appeal based on the validity of earprint analysis overturned this ruling. A DNA profile produced from one of the earprints found at the crime scene was also presented at the appeal. This profile did not match Mark Dallagher’s DNA profile therefore appearing to demonstrate that the earprints could not have been left by this person. Mark Dallagher was subsequently cleared of all charges and released.

This project has investigated the possibility of obtaining a DNA profile from an earprint. The optimal extraction technique for recovery was determined. The possibility of obtaining a DNA profile from a single earprint was tested. The effect of leaving earprints on different materials, the effect of leaving multiple earprints and the effect of uncontrolled conditions on DNA profiling from earprints were all examined. The possibility of contamination was also investigated.

By using the QIAamp DNA micro extraction kit, low copy number (LCN) DNA could be consistently recovered from an earprint. DNA profiles were produced following amplification with AmpFISTR® SGM Plus™ PCR Amplification kit. It was possible in a few cases to produce a full DNA profile. The majority of earprints only produced partial DNA profiles, with less than 50% of loci successfully profiled. Different material types and depositing multiple earprints were not shown to affect the results. Contamination from a secondary DNA source and PCR artefact were observed in the majority of earprints tested. The effect of time and weather on DNA profiling indicated that the ability to obtain a successful DNA profile deteriorated with time (between one and two weeks being the limit of success) and exposure to weather elements prevented an accurate DNA profile being produced.

The results of the project have shown DNA profiling from earprints is currently too inconsistent to be utilised reliably for forensic science.