Application of miniaturized human STRs (Mini-STRs) in DNA based identification of a formalin fixed foetus: A case report

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Accurate identification of an individual is fundamental in DNA based forensic investigations. In order to establish identity of a biological sample, Short Tandem Repeat (STR) DNA markers in the human genome are being used extensively considering their high discrimination power over classical methods of human identification. However, biological samples containing environmentally challenged, degraded or damaged and fragmented DNA in low concentration may reduce the chance of obtaining informative results. When unbuffered formaldehyde is added to a biological sample as a preservative, it makes DNA molecules irreversibly fragmented and degraded resulting conventional DNA testing unsuccessful. Further it was reported that the amount of DNA required for a successful PCR amplification from a formalin fixed tissue is dependent on the time of fixation. This limit increase from 10 ng after three hours to 100ng after one week of fixation in unbuffered 10 % formalin. Even though DNA in the sample is fragmented, miniaturized STR DNA markers (Mini- STRs) can still produce successful DNA profiling results due to its ability to generate reduced sized DNA amplicons during Polymerase Chain Reaction (PCR). We have demonstrated a successful genetic identification of a formalin fixed foetus which has been preserved in 10 % formalin for nearly two months, using a newly designed human Mini-STR DNA marker system. This further highlights how a miniaturized PCR amplicon is more suitable over conventional STR amplification using PCR, highlighting the value of Mini-STR approach for analyzing degraded biological samples in DNA based forensics.