ISOLATION OF MITOCHONDRIAL DNA FROM SINGLE HAIRS WITHOUT ROOTS USING PRESSURE CYCLING TECHNOLOGY

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Hairs are commonly collected from crime scenes, but routine nuclear DNA analysis is not always possible. Mitochondria (mt) provide another source of genetic material that can be used for analysis; however, the isolation method can be laborious with numerous samples. Pressure cycling technology (PCT) is an automated approach that has been used to isolate genetic material, in which samples are subjected to varying cycles of high and low pressure. In this study, we assessed the ability of PCT to extract mtDNA from hair shafts lacking roots. Using three microscopically similar donors, we optimized the PCT pre-treatment along with the number of PCT cycles, maximum pressure and time at maximum pressure. Following this, we compared the yields obtained from PCT extracts to those extracted using glass micro-tissue grinders. Higher yields were recovered from the tissue grinder extracts. However, the number of mtDNA copies recovered from PCT extracts exceeded the requirements for forensic analysis, and the quality of the mtDNA was validated through PCR and sequencing. Thus, it is plausible to suggest the implementation of an automated approach such as PCT for extracting mtDNA from hair shafts. However, when more difficult samples are encountered, the micro-tissue grinder approach might give increased yields.