

PRESSURE CYCLING TECHNOLOGY (PCT) APPLICATIONS FOR FORENSIC DNA ANALYSIS

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PCT has yet to be considered for forensic applications but has the potential to enhance current DNA extraction methods by increasing DNA recovery while preserving the quality of the DNA. PCT exposes biological samples to alternating high hydrostatic and ambient pressures, allowing for molecular interactions to be controlled. This results in baroporation and the release of DNA into solution, while generally maintaining the sample's morphological integrity.

In an effort to increase deoxyribonucleic acid (DNA) recovery from devices used for collecting crime scene biological evidence, such as cotton swabs, samples containing various amounts of purified DNA or epithelial cells were placed onto swabs and processed using Pressure Cycling Technology (PCT). These samples were compared with control samples processed without PCT.

The data illustrated increased DNA yield in samples following PCT compared with those samples not exposed to pressure technology. Examples of increased yield of bone and hair were observed. These results indicate that PCT is a viable method to enhance DNA recovery from forensic samples. PCT can be used in conjunction with commercially available extraction reagents.

This study demonstrates the capabilities and potential of PCT applications for forensic DNA analysis of biological evidentiary samples. The impact is that some samples that traditionally yield too little DNA for typing may now be suitable for routine analysis. Thus, more cases may be solved with this combined approach of PCT and DNA extraction. Current efforts involve developing protocols to obtain consistently high yields from challenged samples.