

## B128 The Extraction and Genotyping of Human DNA in a Still Body Aqueous Environment

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**Learning Overview:** After attending this presentation, attendees will have a better understanding of the degradation and migration of DNA from epidermal tissue in a still body of water. The importance of this study is to help implement new protocols with forensic applications to increase the number of missing person cases solved.

**Impact on the Forensic Science Community:** The use of forensic science is minimal in missing person cases unless unknown remains are found. This presentation will impact the forensic science community by providing information on a DNA processing method that could be added to the current protocols for missing person cases. This study will encourage the involvement of forensic applications early on in the search for missing persons cases and hopefully reduce the time the individual remains are unaccounted for.

The number of missing person cases has increased in the United States alone from 85,459 active cases in 2018 to 87,438 active cases in 2019, but this research attempts to provide a novel forensic technique for solving more of these cases.<sup>1</sup> The presence of DNA, from the deposition of human epidermal tissue, in a still body of water, such as a lake or pond, was sampled every other day at specific intervals over a 30-day period. Sampling occurred every 4 feet starting at the sample and stopping at 12 feet from the sample origin. A total of five samples was taken every other day. This study will determine the length of time source DNA can be detected and if it can successfully be genotyped when collected from an aqueous environment. The study will also determine if weather conditions cause an increase or decrease in the migration or degradation of the DNA being observed. By repeating the experiment for the spring and summer seasons, along with a control sample for each, possible trends can be established for varying weather conditions. The purpose of the control sample is to indicate if there are any interactions within the aqueous environment (aquatic life such as microbes) that may affect the degradation or migration of human DNA. A human epidermal tissue was used, and it experienced a natural decay process. The 15mL samples collected were deposited onto a Whatman® 0.2µm 47mm nylon membrane with vacuum filtration, and the paper was used for extraction, followed by a QIAGEN® DNeasy® Blood and Tissue kit. This kit is commonly used in environmental research laboratories, especially with environmental DNA (eDNA). Both the natural decaying process and the extraction were chosen to ensure a more realistic crime scene scenario. The concentrations of DNA at all intervals for each season were obtained in order to indicate any possible trends for further analysis. Only samples with higher DNA concentrations were processed for further analysis. Amplification was performed using the GlobalFiler® Polymerase Chain Reaction (PCR) amplification kit. Genotyping was performed using the SeqStudio™ genetic analyzer to indicate which Short Tandem Repeat (STR) loci show consistency between the known and unknown samples. This step is necessary to help ensure that the methods used are working and can be used to create a protocol for missing persons cases. This study aims to provide enough evidence that human DNA can be collected and extracted from an aqueous environment and still obtain a viable genotype for identification.

Preliminary tests showed that the highest concentration of DNA being secreted is coming from the skin of the sample and not the fat. This information concludes the skin area of the sample should be the same size for every trial, but the amount of fat present will not cause a large difference in the concentrations being observed. Results to date also indicate that the DNA concentration is higher at the interval that is closest to sample.

This research aims to implement new and more extensive searching protocols for detailed missing persons cases. The new protocol could increase the amount of missing persons cases solved yearly and employ the use of future eDNA cases toward a forensic outlook.

### Reference(s):

<sup>1</sup>. Federal Bureau of Investigation. 2018/2019 NCIC Missing Person and Unidentified Person Statistics. FBI. 25 Mar. 2019.

### DNA, Degradation, Genotyping