A63 DNA Analysis and Document Examination: Impact of Technologies on Respective Analyses

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After attending this presentation, attendees should appreciate how best to maximize evidence from documents that require DNA testing and document examination.

This presentation will impact the forensic science community by improving evidence obtainable from document exhibits.

With the enhanced sensitivity of specialized DNA profiling techniques there is now an increased demand to undertake DNA analysis on a range of samples that contain low amounts of template DNA (LtDNA). DNA can be deposited on a document by the writer of a ransom note, for example. Epithelial cells are likely to transfer from various parts of the hand and lower arm when these areas come in contact with the document during writing. Cellular material may also fall onto the document from the face and clothing. Therefore, DNA profiles from documents may provide useful probative evidence, particularly in conjunction with evidence obtained through document examination techniques. This research evaluated the ability to recover DNA from touched documents while maintaining the integrity of the document, so as to maximize the evidence from forensically examined documents. To ascertain which places on a document were most frequently touched when writing, a group of volunteers were asked to write a set paragraph and on completion, fold the document into an envelope, while being observed by the researcher. The writing observation study indicated that there were significant points of contact between the writer and the margins, central face area, and fold lines of the document. Non-invasive sampling methods were tested so that the integrity of the document could be maintained for subsequent examinations. Wet/dry swabbing and dry/dry swabbing were both found to be equally effective at recovering DNA from paper, however difficulties were experienced with a tape- lifting method tested. The amounts of DNA recovered from the most commonly touched places were determined. These showed that the best sampling site for the recovery of touch DNA from documents were the fold lines of the document, as these samples consistently provided the highest DNA yields among the participants. This was not an unexpected finding. When a document is folded, there is heavy pressure applied to flatten and crease the paper and this contact allows loosely adhering epithelial cells from the hands to transfer to the paper. DNA was also recovered from other sampling sites, including the face of the document and the top corners. DNA profiling results were successfully obtained after targeted sampling. DNA inhibitory effects were also evident in a number of the samples profiled, with DNA results being obtained after dilution of the extract.

This research also investigated the impact of document examination techniques on DNA recovery. Commonly employed document examination techniques; the electrostatic detection apparatus, UV light, and the video spectral comparator were investigated to determine their effect on DNA recovery. The results indicated that the ESDA examination had the most deleterious effect on DNA recovery. Furthermore, the impact of DNA recovery on subsequent document examination techniques were examined with results indicating that DNA sampling from fold lines, by swabbing, had the least impact on subsequent document examinations. The findings from this research, and those of a larger investigation, assisted in recommending best practice guidelines for the examination of documents by forensic biologists and document examiners. The findings also indicated how the two disciplines could be coordinated in such a way so as to maximize the evidentiary value of document exhibits.

Document, DNA, Touch

 ** Presenting Author*