

MAXIMIZATION OF DNA RECOVERY FROM CONTACT/TOUCH EVIDENCE: USING THE EPPENDORF VACUFUGE® PLUS WITH THE QIAGEN DNA INVESTIGATOR KIT

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The Jefferson Parish Sheriff's Office (JPSO) DNA Laboratory routinely conducts DNA analysis on a high volume of contact/touch DNA evidence. Samples from firearms, vehicle interiors, burglary tools and clothing are common. Approximately 50% of all JPSO DNA cases contain some form of contact/touch DNA evidence. These samples are usually in the form of swabs or fabric cuttings. More effective extraction methods were needed in order to increase per microliter extraction yields. The laboratory's established stochastic threshold is 70 picograms. Recovery of greater than or equal to 0.007ng/μl meets this threshold for standard PCR amplification reactions.

Vacuum drying centrifuges are standard equipment in molecular biology laboratories. Eppendorf Vacufuge® Plus vacuum drying centrifuges were evaluated for the evaporation of DNA extracts initially eluted in 50 μl of water (Qiagen DNA Investigator Kit). Eluted samples were vacuum dried down to 2μl to 5μl and reconstituted to a total volume of 25μl in TE⁻⁴. This process added an average of one hour to the purification process and resulted in the recovery of significantly higher DNA yields.

RESULTS

	Sample A – Shirt Quant Human result¹	Sample B – Gun grip swab Quant Human result¹
Extraction Method		
Standard EZ1 Extraction (Old)	0.027 ng/μL	0.014 ng/μL
Extraction & Vacuum Drying (New)	0.194 ng/μL	0.025 ng/μL

All work using the Eppendorf Vacufuge® Plus is conducted at room temperature; this study showed applying heat to the vacuum process had no positive impact on DNA recovery or time duration required to dry extracts.

PCR amplification of the samples in this study produced high quality results. Two protocols incorporating vacuum drying, one for fabric samples (Large Sample DNA Extraction and Eppendorf Vacufuge® Plus Concentration) and one for contact/touch DNA swabs (DNA Extraction and Eppendorf Vacufuge® Plus Concentration) are now used in DNA casework.

The lab is now obtaining results from samples that would have failed in the past. This allows the lab to better fulfill its duties to the community by extending its ability to include or exclude suspects.

1 = mathematical correction factor applied. ☹