

## HIGH SUCCESS RATE IN HIGH-THROUGHPUT TESTING OF NON-SUSPECT CASEWORK SAMPLES

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In recent years, most states have implemented the CODIS system and a number of states have input significant numbers of convicted-felon DNA profiles at either the state or national level. This work highlights the need to address testing of backlogged non-suspect casework samples. Testing the tens of thousands of non-suspect samples that are currently backlogged in the U.S. will provide casework comparison profiles, resulting in the solution of thousands of unsolved crimes and the conviction of thousands of criminals. This issue is being addressed by the National Institute of Justice through a \$15 million non-suspect case backlog funding initiative.

In jurisdictions that have a large number of backlogged non-suspect cases, it is most efficient to address these cases with a high-throughput system that tests the single most probative piece of evidence for upload into CODIS. Evidence is screened for a positive sample, which can then be batched for testing.

We have developed a high-throughput testing system for non-suspect casework for the Suffolk County Crime Laboratory. The crime laboratory screens sexual assault evidence for semen and screens other evidence for blood, then sends part of the evidence to Fairfax Identity Laboratories for analysis. Evidence is logged into the evidence tracking system, then batch processed. DNA is extracted by either differential lysis (semen) or standard digestion (blood) and organic extraction, followed by Microcon concentration. Human DNA is quantitated then amplified using the Profiler Plus™ and COfiler™ systems. Barcoding and automated liquid handling systems are used to reduce labor and ensure accuracy. Data is analyzed by two independent analysts and electronically compared. Finally, DNA profiles are processed to produce CODIS-upload files. CODIS upload data and all case notes are returned to the Suffolk County Crime Laboratory.

Success rates have been high at each step of the process. Sexual assault samples had from “very few” to “++++” sperm. Male DNA was recovered from ~95% of all samples. Where no male DNA was recovered, the samples had “few” sperm (other samples with “few” sperm yielded sufficient male DNA). Unmixed profiles were obtained in 50% of samples; an additional 20% had only a trace of female DNA. Obtaining unmixed profiles correlates better with male to female DNA ratio than with sperm number or DNA recovered. CODIS upload files were returned to Suffolk County Crime Lab for 70% of sexual assault samples. The Suffolk County Crime Laboratory deduced the male contributor from the majority of the mixtures, using the victim's reference profiles. The result is that approximately 90% of the samples generated profiles that were uploaded into CODIS. Cold hits occurred on the non-suspect case samples at the historical rate of samples uploaded from the Suffolk County Crime Laboratory.