



B4 mtDNA Validation in a State Laboratory

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After attending this presentation, attendees will receive a thorough overview of the planning, purchasing, experimentation, and troubleshooting involved in the validation of mitochondrial DNA (mtDNA) testing within a State laboratory that had no prior mtDNA experience.

This presentation will impact the forensic community and/or humanity by demonstrating the mtDNA validation plan, the underlying product research and experimentation outlined in this presentation can serve as a starting point for any State/Local laboratories that are interested in establishing mtDNA testing.

The DNA Unit of the Delaware Office of the Chief Medical Examiner (OCME-DNA Unit) has recently implemented mtDNA processing. The projection was for the OCME-DNA Unit to develop mtDNA testing in order to aide the medical examiners in the identification of remains and also to support criminal investigations involving hair evidence.

Due to the inception of the FBI Regional mtDNA laboratories many do not see establishing State/Local mtDNA processing laboratories as a priority. Conversely, the main focus of National Institute of Justice's (NIJ) Director Hart at the recent 6th Annual NIJ DNA Grantees Workshop was the identification of missing persons and the role of mtDNA in that process. There is a long term need for mtDNA processing that will exceed the capabilities of the FBI Regional mtDNA laboratories and the University of North Texas program, and can be fulfilled by State/Local laboratories. Furthermore, mtDNA testing at the State/Local level will be necessary to support the institution and success of CODIS Missing Persons (MP).

Prior to the validation of mtDNA, the OCME-DNA Unit solely performed autosomal STR analysis. Due to the lack of State/Local laboratories with mtDNA capabilities, the OCME-DNA Unit found itself with no "role model" laboratory to consult with during the validation of mtDNA processing. The OCME-DNA Unit had to develop a validation plan that included examination of the practical aspects of each option, comparing finances, considering time and labor, and tailoring the entire procedure to the projected requirements.

Some decisions and choices were made from extensive product research as it was often cost prohibitive to purchase multiple options and do comparison studies. This was typically applied to decisions concerning equipment or overlying methodology. Options concerning specific techniques for sample preparation were surveyed for maximum yield and/or quality of single-source sequencing results by the OCME-DNA Unit. The studies to optimize sample preparation methodologies were conducted on bones (bleach washes versus no bleach washes), hairs (micro-tissue grinders versus enzymatic digestion), and teeth (extraction of mtDNA from the entire tooth versus extraction of mtDNA from the dentin). Data and conclusions will be presented from these comparison studies, as well as for other validation studies.

The research, experimentation and thought-processes involved in establishing this mtDNA laboratory from the ground up will be shared and discussed. All results and findings from the validation process and associated studies will be presented, as well as any lessons learned regarding the original decisions.

mtDNA, Validation, State Laboratory