B215 The Development of the National Institute of Standards and Technology (NIST) Standard Reference Material (SRM) 2391d: The Next Iteration of the Polymerase Chain Reaction (PCR) -Based DNA Profiling Standard

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After attending this presentation, attendees will understand the benefits and potential differences of the next iteration of the NIST SRM 2391d: PCR-Based DNA Profiling Standard.

This presentation will impact the forensic science community by demonstrating what is involved in developing and characterizing a NIST SRM, as well as what will be different about this SRM when compared to the current 2391c version.

The first NIST Standard Reference Material (SRM) 2391: PCR-Based DNA Profiling Standard was developed in 1993 and produced in 1995 when it became apparent that a standard reference material was necessary to ensure accurate and comparable measurements between laboratories in the DNA forensic community.[1] In fact, it was eventually used to address the United States Federal Bureau of Investigation's (FBI's) Quality Assurance Standards (QAS) for laboratories conducting forensic DNA testing that were published in 2000 and updated in 2011 (Sect. 9.5.5): "The laboratory shall check its DNA procedures annually or whenever substantial changes are made to a procedure against an appropriate and available NIST standard reference material or standard traceable to a NIST standard."[2] Since then, several iterations of the SRM have been made available as the prior versions were depleted. SRM 2391c is the current version and is expected to be depleted in February 2018 based on reported sales.[3] Work has begun on planning the next iteration: SRM 2391d, so it is available to the community when SRM 2391c is completely exhausted. The historical significance of these standards is important and will be briefly discussed.

There is a great deal of planning and strategizing involved when beginning the process of producing an SRM. The technology and needs of the DNA forensic community are constantly changing and evolving and these need to be considered when selecting samples and determining what techniques will be used for certification. The thought processes behind the development and production of SRM 2391d will be explained and input from the community will be addressed.

Because of the advances in technology and new Short Tandem Repeat (STR) markers recently required for Combined DNA Index System (CODIS), new information will be included and certified with SRM 2391d. The samples that are chosen will have certified genotypes/haplotypes for the commercially available STR markers via characterization by capillary electrophoresis, Sanger sequencing, and next generation sequencing. Concordance between the results of the fragment-based and sequence-based methods will serve as validation for the certified values that will be assigned for each marker run with the chosen SRM samples/components. A summary of what is planned for SRM 2391d will be presented.

Reference(s):

1. Coble M.D. et al. (2011). Metrology needs and NIST resources for the foresnic DNA community. *Accred. Qual. Assur.* 16: 293-297.

2. Quality Assurance Standards (QAS) for Forensic DNA Laboratories (2011). Available online at https://www.fbi.gov/file-repository/quality-assurance-standards-for-dna-databasing-laboratories.pdf/view. Accessed August 1, 2016.
3. SRM 2391c: PCR-Based DNA Profiling Standard Certificate of Analysis (2015). Available online at https://www-s.nist.gov/srmors/certificates/2391c.pdf. Accessed on August 1, 2016.

Forensic DNA, Standard Reference Material, STR Markers