

SWGAM Committee/Working Group Updates



July 2022



Committees

- Autosomal STR Interpretation
- CODIS
- Laboratory Operations
- Lineage Marker
- Next Generation Sequencing
- Quality Assurance
- Rapid DNA



Working Groups

- Forensic DNA Casework Expert System
- Investigative Genetic Genealogy



Committee Updates



Autosomal STR



Committee Goals/Objectives

- Review and revise as needed the Interpretation Guidelines for Autosomal STR Typing
- Current objective is to draft new guidelines for interpreting probabilistic genotyping data using electrophoresis-based data



Committee/WG

Tasks/Accomplishments of Mtg

- Held bi-weekly conference calls
- Continuing to work through remaining sections and finalize for the EB



Committee/WG

Tasks/Accomplishments of Mtg

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- Current draft contains
 - 11 core elements
 - Key Takeaways and corresponding validation elements
 - Guidelines
 - Practical examples
 - Glossary of PG terms and topic-based publications



Committee/WG

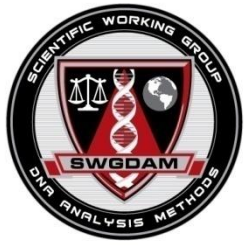
Tasks/Accomplishments of Mtg

- Guidelines include both foundational concepts and case-specific applications
- As applicable to PGS, incorporated SWGDAM recommendations for communicating LRs
- Reference SWGDAM PG validation guidelines
- Brought in perspectives from multiple PGS to account for model diversity



Committee/WG Tasks/Accomplishments of Mtg

- Plan is to continue to have biweekly conference calls to complete the document over the next few months



CODIS



CODIS Committee Goals/Objectives

Objectives:

- To identify, evaluate and research issues relating to the use of CODIS in federal, state, and local forensic laboratories
 - If in the course of the review of such issues, the CODIS Committee determines that revisions to the FBI Director's Quality Assurance Standards for Forensic DNA Testing Laboratories and DNA Databasing Laboratories are needed, the Committee shall recommend such changes to the Chair of SWGDAM for consideration by SWGDAM.
 - If the CODIS Committee is presented with issues relating to the operation of CODIS, such as software functionality and performance, the Committee shall forward such issues and their findings/recommendations through the SWGDAM Chair to the Chief of the CODIS Unit.
 - The CODIS Committee will review issues requested by the NDIS Procedures Board through the SWGDAM Chair and will provide their findings and recommendations through the SWGDAM Chair to the Board.



Committee Tasks/Accomplishments

- Probabilistic Genotyping and CODIS Guidance
- Development of Databasing Forum



CODIS Community Input

Solicited CODIS Community input on the following:

- How are you determining what is entered into CODIS?
- Does the entry ever differ from what you report?
- How are you addressing review of matches. Especially matches to multiple profiles?
- How are you reporting these matches?



Database Committee Goals/Objectives

- To share information regarding the high-throughput processing of DNA reference samples by law enforcement laboratories conducting forensic DNA testing and report to SWGDAM.
 - Recommend and develop guidance documents or other SWGDAM product for the high-throughput processing of DNA reference samples by law enforcement laboratories conducting forensic DNA testing.
 - Review and, as necessary, recommend revisions to the FBI's Quality Assurance Standards (QAS) and the NDIS Operational Procedures Manual for the consideration of SWGDAM.



Laboratory Demonstration Data

Amplification kit(s) used by laboratory (Demonstration data)	Count
QIAGEN Investigator 24plex QS	1
Promega Powerplex® Y23	4
Promega PowerPlex® Fusion 6C	106
AB AmpFISTR® Yfiler®	100
AB AmpFISTR® Yfiler Plus®	57
AB GlobalFiler™	106
Promega PowerPlex® Fusion	38
AB AmpFISTR® MiniFiler™	5
AB AmpFISTR® Identifiler®	1
AB GlobalFiler™ Express	15
AB AmpFISTR® Identifiler® Direct	50
QIAGEN Investigator 24plex GO!	4
Thermo Fisher VeriFiler Plus TM	1
Argus X-12	1
FlexPlex 27 (ANDE A and I Chips)	1
mtDNA sequencing	1
AB Precision ID mtDNA Whole Genome Panel	1



Laboratory Operations



Committee/WG Goals/Objectives

- Identify, evaluate, and research issues related to the efficient generation of high-quality DNA testing data by forensic laboratories
- SWGDAM Validation Guidelines for Forensic DNA Analysis Methods



Validation Guidelines

- The Validation Guidelines were last overhauled in 2012
- The 2016 update included NGS information
- In 2019, the concept of an “Overview document” with “supplemental Modules” was conceived in the LabOps Committee



Committee/WG

Tasks/Accomplishments of Mtg

- Tasks:
 - Group meets virtually bi-weekly or weekly to work on documents.
- Accomplishments:
 - The following documents are almost ready for submission to the EB pending formatting consistency:
 - Validation Overview Document
 - Rapid DNA module
 - Autosomal Multiplex module



PGS Module

- General
 - Attempt to address most common PGS programs
 - Example studies provided throughout
 - Mention semi-continuous, but focus on fully continuous methods
 - Make the point that the analyst(s) performing the validation possess the appropriate foundational knowledge in the interpretation of mixture profiles and calculation of LR.



PGS Module

General considerations

- Overarching PGS Validation Concepts
- System control – Installation and setup

Internal validation:

- Defining system parameters describes prerequisite studies/customization which may be necessary
 - Analytical threshold
 - Allele drop-in
 - Stutter expectations
 - Saturation limit (dynamic range) of the CE instrument
 - Allelic peak height variation (including allelic drop-out)
 - Intra-locus peak height
 - Inter-locus peak height



PGS Module

Internal Validation continued:

- Functional testing
 - Performs the intended tasks and functions as expected
- Reliability testing (“physical” reliability and “usability limits”)
 - Reliability testing is the process of testing a software program beyond its functional aspects to ensure it works appropriately in the laboratory environment
 - “usability limits”, or operational limits, are considered defining conditions which cause a failure of the software to function



PGS Module

Internal Validation continued:

- Accuracy testing
- Sensitivity testing
- Specificity testing
- Precision testing
- Additional challenge testing
- Additional feature testing



PGS Module

Expressing LR_s

- Verbal Scale 2018
 - Advocated verbal equivalents instead of an uninformative range (other than 1)
 - Some labs are reporting the verbal scale, some labs aren't
- Some labs are reporting uninformative ranges based on respective internal validations
- Rare labs are reporting a non-contributor range for a particular mixture profile



PGS Module

- Current plan:
 - Module to be written with mention of both the Verbal Scale and an uninformative range
- Consult with the Autosomal Committee
- Feedback is encouraged...



NGS Module

- Lap Ops subcommittee is working with NGS subcommittee for input on the NGS module.
 - NGS created a draft document
- After a primary review, it was decided that the draft would be split into a general NGS overview document and specific validation module(s).
- Work is moving forward on the ForenSeq Illumina (NDIS approved) validation module.



Committee/WG

Pending/Outstanding Issues

- Pending:
 - Validation Overview Document
 - Rapid DNA module
 - Autosomal Multiplex module
 - Module list
- In process:
 - PGS Validation module
 - NGS Validation module
 - List of modules
- Future plans:
 - Quantification Validation module
 - Ystr Validation module



Lineage Marker



Committee Goals/Objectives

- Update 2014 Y-STR Interpretation Guidelines
- Update 2019 mtDNA Interpretation Guidelines (post NGS-specific revisions)
- Provide necessary updates regarding YHRD changes
- US Y-STR historical document & support letter for YHRD
- Test Discrete Laplace on US Y-STR database



Committee

Tasks/Accomplishments of Mtg

- Documents approved March 2, 2022:
 - Interpretation Guidelines for Y-Chromosome STR Typing
 - Supplemental Information for Interpretation Guidelines



Committee

Tasks/Accomplishments of Mtg

- January 28, 2022: Issued YHRD update letter via swgdam.org, NDIS custodian, user groups
 - YHRD search changes
 - Changes considered a major software revision



Committee

Tasks/Accomplishments of Mtg

- February 2022: Decision was made not to pursue the creation of a US Y-STR historical document
- Moving forward with YHRD support letter



Committee

Tasks/Accomplishments of Mtg

- Discrete Laplace testing with US Y-STR data
 - Committee tested
 - Abstract submitted and accepted as poster at ISFG meeting
 - Poster in revision
 - ISFG poster sessions 8/31, 9/1, and 9/2



Committee

Pending/Outstanding Issues

- Present the DL poster at ISFG
- YHRD support letter
- Update 2019 mtDNA Interpretation Guidelines



Next Generation Sequencing



Committee/WG Goals/Objectives

Identify, evaluate, and research issues relating to the forensic applications of next generation sequencing.

Tasks

- NGS revisions to existing SWGDAM Interpretation Guidelines
- Review and, as necessary, recommend NGS revisions to the FBI's Quality Assurance Standards (QAS)
- Generate and review forensic NGS data and make regular reports to SWGDAM



Current Tasks

1. SNP analysis and interpretation guidelines
2. Lab/TL NGS survey
3. With LabOps - NGS validation guidelines



SNP Guidelines

- Draft nearly complete
 - Geared towards commercially available forensic assays
 - Describes classes of SNPs – II, AI, PI, lineage
 - Structure largely mirrors CE auSTR document
 - AT, ST, locus designation, allele designation, etc.
 - Document provides more information/resources than other SWGDAM documents as a result of this being the first SNP interpretation document
- Recent focus:
 - Statistics
 - Guidance for addressing linkage/linkage disequilibrium
 - SNPs in commercial assays
 - SNPs/STRs in commercial assays
 - Interpretation of, and caveats for, ancestry and phenotype predictions



SNP Guidelines

- Met with Executive Board in June 2022
 - Provided broad overview of document for feedback
- Briefly addressed if/how this document should address FGG
- NGS Committee plans to survey lab TLs to get a better handle on SNP applications
- In the meantime, we continue to polish the current document



TL NGS Survey

- Committee interested in getting a direct handle on the state of NGS in forensic labs
 - Tease out disparate information we currently have coming from presentations, publications, private lab advertisements, word of mouth, etc.
- Just finished developing a survey that asks specific questions about:
 - Instruments
 - Assays
 - Use Cases
 - Implementation Status
 - Future Plans
- Asks what SWGDAM can do to help
- Hope to conduct the survey annually

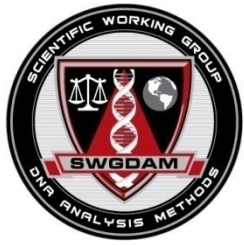


NGS Validation Document

- Working with LabOps Committee to develop NGS validation guidelines
 - Broad NGS draft module provided to LabOps in March 2022
 - Written to cover the numerous NGS workflows available
 - Met with LabOps to go over the module
 - Collective group decided to write assay specific modules to provide more detail
 - Expect we will need multiple
 - Plan to start with a module for the Verogen Signature Prep Kit over the coming months
 - Elements of the current broad NGS module will be incorporated in the overview LabOps validation document
 - Ensure critical, general NGS items are captured here while the workflow specific modules are developed.



Quality Assurance



QA Committee Goals/Objectives

- The Quality Assurance (QA) Committee is a standing committee tasked to identify, evaluate, and research issues relating to monitoring and maintaining the quality of DNA testing results in forensic laboratories.
 - The QA Committee serves as the primary body for reviewing the FBI's Quality Assurance Standards (QAS) on behalf of SWGDAM and for the incorporation of proposed changes to the QAS recommended by other SWGDAM Committees.
- Review QAS frequently asked questions and update the QAS Guidance Document.



QA Committee

Tasks/Accomplishments of Mtg

- QAS Guidance Document comment review and edits
 - Adjudicated a majority of the comments
 - Need full SWGDAM discussion on coursework guidance additions (Monday's discussion)
 - Need to ensure necessary corrections made based on this week's input on software.



QA Committee

Pending/Outstanding Issues

- Complete revisions to the QAS Guidance Document and forward to Executive Board.
- Continue work on Standard 8 Audit Document tool.
 - “Matrix” to aid in the completion of audit document for Standard 8.
- Potentially disseminate QAS coursework requirements letter to AAFS students and colleges/universities via .edu emails.
- Initiate targeted revisions to QAS.



Rapid DNA



Committee Goals & Objectives

- Rapid DNA Booking Station implementation
- Possible path to Rapid DNA and crime scene samples and CODIS
 - Anticipated changes to QAS
 - Guidance
- Missing Persons/Body ID and Rapid DNA



Committee Tasks/Accomplishments

- Monthly Web meetings February – July 2022
 - Compiling a conceptual outline of a crime scene Rapid DNA QAS Addendum for presentation at the July SWGDAM meeting



Committee

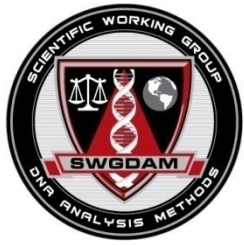
Pending Activities

- Booking Station
 - Continue monitoring Booking Standards for any future changes
- Planning for possible crime scene evidence application and CODIS
 - Monitor maturity of Rapid technology and enhancements outlined in the Joint Letter to the Editor
 - Path to Rapid DNA and crime scene evidence when technology enhancements and data support moving forward
 - Rapid QAS Addendum may be the best way to address



Committee Future Meetings

- Continue monthly web meetings



Working Group Updates



Forensic DNA Casework Expert Systems

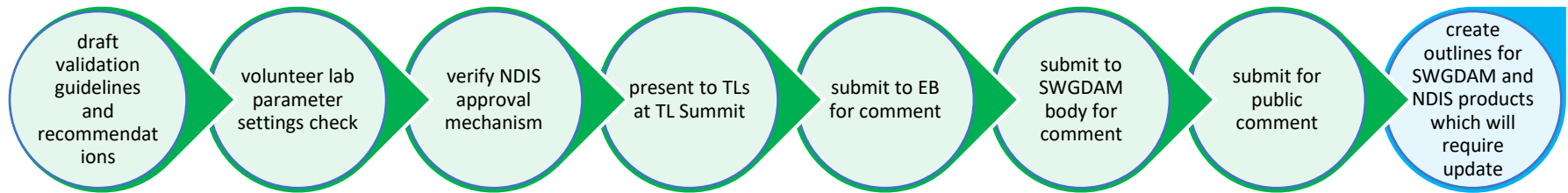


Committee Goals/Objectives

- SWGDAM has empaneled a Forensic DNA Casework Expert System Working Group (FESWG) to explore and develop validation guidelines for the use of an Expert System with Forensic (i.e. casework) samples.
- The FESWG is an extension of the 2005 SWGDAM Expert System Committee that recommended the current expert system requirements for database samples and casework reference samples that NDIS adopted.
 - The FESWG will evaluate the feasibility of using allele calling software tools as expert systems (as defined in the NDIS Operational Procedures) for interpreting forensic casework.



Committee Tasks/Accomplishments



All milestones clear!



SWGDM Expert System for Forensic Sample Validation Guidelines

- March 2, 2022 Validation Guidelines for the Use of an Expert System with Forensic Samples (discussion draft) approved
- March 7, 2022 discussion with EB and Jocelyn for the next steps for the new SWGDM Validation Guidelines



Implementation needs: QAS Revision

- Standards (at a minimum) which will require updates:
 - Standard 8
 - Standard 9
 - Standard 10
 - Standard 12
 - Standard 17



Revision of NDIS Operational Procedures

- Areas of update
 - NDIS developmental validation requirements for Expert Systems used for forensic samples based on Validation Guideline recommendations
 - NDIS internal validation requirements for Expert Systems used for forensic samples based on Validation Guideline recommendations
 - 4.1.1 Use of Vendor Laboratory
 - 4.5 Standards for the Use of an Expert System at NDIS



Other Considerations?

- When to publish validation guidelines?
- Life after committee - incorporate CWES in the Lab OPS validation document?



Investigative Genetic Genealogy



IGG WG

Goals/Objectives

- In July 2020, the SWGDAM Chairman communicated three tasks to the IGG Working Group:
 - The IGG WG will monitor and report on the use and/or implementation of Investigative Genetic Genealogy by forensic DNA laboratories.
 - The IGG WG will monitor and report on issues relating to the amount of DNA, degradation, and mixtures and if appropriate, provide considerations and/or recommendations for forensic DNA laboratories.
 - The IGG WG will discuss and report on topics relating to the role of the forensic DNA laboratory in the use of Investigative Genetic Genealogy.



IGG WG Meetings

- January, March, May, June and July
- David Russell from Signature Science – Center for Advanced Genomics:
 - Illumina GSA iScan Validation: (ISHI Poster)
 - Confirmed practitioner experience (NIST DNA)
 - ~70% Call Rate needed
 - Human Specificity



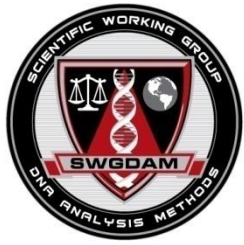
IGG WG Meetings

- March
- Professor Ed Green
 - Ancient DNA Expert
 - Founder of Astrea Forensic
 - Specializing in Hair and Skeletal Remains
 - Clarion Bio provides reagents for Paleo DNA analysis
 - Explained - Discussed Imputation for SNP file production.



IGG WG Meetings

- May, June, July
- Continued revision of CODIS Survey Q's
 - More specific for CODIS Lab involvement and staff level of effort.
 - Liaison with SNP and/or WGS Labs
 - Use and involvement with WGS
 - Recent topics of interest discussions



Contact Us

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