

Morning Session
8:00 am - 11:30 am

**On-Boarding NGS-Based Assays:
Key Considerations and Case Studies**

November 15, 2023 ● Salt Lake City, UT

7:30am **Registration/ Checkin**

8:00am

Welcome and Introductions | **Alanna Church, MD**, *Boston Children's Hospital, Harvard Medical*

8:05am

Garbage In, Garbage Out: Nucleic Acid Quality and NGS Testing | **Eli S. Williams, PhD, FACMG** *University of Virginia*

Molecular diagnostics depends on the extraction of nucleic acids of sufficient quality and quantity for downstream applications, from single-gene testing to whole genome sequencing. Pre-analytical considerations, such as specimen type and transport conditions, can influence nucleic acid quality. In this session, participants will review key variables affecting nucleic acid quality and learn strategies addressing common problems in nucleic acid extraction to improve NGS results.

Learning Objectives

- Understand the impact that poor nucleic acid quality can have on NGS test performance
- Recognize the common pre-analytical variables impacting nucleic acid quality
- Discuss nucleic acid isolation practices that minimize harm of suboptimal specimens

8:30am

Navigating Artifacts in Next Generation Sequencing | **Thomas D. Lee, MD, PhD**, *UCLA David Geffen School of Medicine*

Review of next generation sequencing data involves distinguishing real variants from artefactual changes. This session will examine some common artifacts that may be present in sequencing data as well as in commonly used reference databases to help generate a mindset that will aid practitioners in accurately calling variants for reporting.

Learning objectives

- Explain the origins of common sequencing artifacts
- Identify artifacts in commonly used reference databases
- Distinguish real variants from artifacts and report appropriately

8:55am

Clinical interpretation of NGS Analysis Results | **Yang Cao, PhD, FACMG**, *Washington University in St. Louis*

This session of clinical interpretation of NGS analysis results will focus on variant classification, result analysis, and report generation for both germline and somatic testing. This session is crafted to equip geneticists, pathologists, clinicians, and researchers with the requisite expertise to navigate the intricacies of genomic data analysis with precision. We will delve comprehensively into the ACMG/AMP guidelines, somatic variant classification paradigms, and optimal methodologies for the identification and characterization of genetic variants.

Learning objectives

- Apply appropriate guidelines to determine NGS variant classification
- Interpret the clinical significance of NGS results
- Design comprehensive clinical NGS reports
- Apply NGS genomics into clinical practice

9:20am Break

9:30am

Concurrent BREAK-OUT Sessions (Each case study session will be 30 minutes)

Case Study 1 – Infectious Diseases

Cecilia M. Thompson, PhD, D(ABMM), MLS(ASCP)CM *Ann & Robert H. Lurie Children's Hospital of Chicago*
and Rebecca Yee, PhD., D(ABMM), M(ASCP), *George Washington University*

This interactive case study is designed to review how new multiplex molecular PCR panels and sequencing technologies are integrated into the clinical microbiology laboratory. This case study will focus on the diagnosis of infections utilizing molecular methods such as multiplex PCR panels and next generation sequencing (NGS) in the diagnostic process. We will cover the advantages and disadvantages of the different molecular technologies and the clinical information that each provides.

Learning Objectives

- Describe ways to ensure the accuracy of patient results when implementing a molecular assay
- Discuss the utility and application of NGS testing in infectious diseases
- Explain how novel molecular technologies are implemented into current microbiology workflows

Case Study 2 – Solid Tumors

Ying-Chun Lo, MD, PhD, *Mayo Clinic* **and Anna Matynia, MD,** *University of Utah Department of Pathology / ARUP Laboratories*

In this interactive case study, we will review a short series of solid tumor cases that underwent testing by next generation sequencing (NGS) assays showing unusual mutation patterns such as two variants in the same gene or seemingly mutually exclusive variants in two genes.. The crucial question of whether these variants are real versus artifacts and its clinical meaning must be answered before reporting. We will have interactive discussions on potential explanations, including basic tumor biology, as well as confirmatory approaches (including other molecular methodologies) and practical troubleshooting steps.

Learning Objectives

- Explain basic NGS data interpretation
- Troubleshoot when unexpected multiple mutations in a solid tumor were detected
- Describe the utility of different molecular assays for different types of alterations

Case Study 3 – Hematopathology

Kenneth Ofori, MD, MHS, *Indiana University School of Medicine,* **Joanna Conant, MD** *University of Vermont Medical Center* **and Jennifer Bynum, MD** *Northside Hospital Atlanta*

This interactive case study is designed to bring you up to date on idiopathic cytopenia of undetermined significance (ICUS), clonal cytopenia of undetermined significance (CCUS), and myelodysplastic neoplasm/syndrome (MDS). These case studies will focus on the diagnosis of and differentiation among these entities, the utility of next generation sequencing (NGS) in the diagnostic process, and exploration of the new molecular prognostic scoring system for MDS (IPSS-M).

Learning Objectives

- Identify important diagnostic criteria to distinguish among ICUS, CCUS, and MDS.
- Describe the utility of NGS testing in the workup of unexplained cytopenias.
- Apply the IPSS-M score to selected cases.

Case Study 4 - Genetics

Eli S. Williams, PhD, FACMG *University of Virginia* and **Yang Cao, PhD, FACMG** *Washington University in St. Louis*

Join us as we dive into genetics case studies, which will showcase the power of next-generation sequencing (NGS) technology in unraveling genetic mysteries. In this session, we'll explore real-world genetic puzzles while providing insights into NGS methodology, data analysis and interpretation, and the impact NGS can have for our patients. This session is a "must-attend" event for geneticists, clinicians, researchers, and genomics enthusiasts eager to unlock the secrets of the human genome.

Learning Objectives

- Identify NGS principles, workflows, and applications in constitutional genetics cases
- Describe the steps and tools involved in NGS data processing
- Interpret the significance of NGS Results in various clinical contexts
- Apply NGS technology into clinical genomics practice

11:30am Closing Remarks | **Alanna Church, MD**, *Boston Children's Hospital, Harvard Medical*