

Toward Sequencing and Mapping of RNA Modifications: A Hybrid Workshop

March 13th, 2023 – March 15th, 2023

2101 Constitution Ave NW, Washington, DC 20037

Room 120



MONDAY, MARCH 13, 2023 (all times in EST)

CLOSED SESSION

[CLICK HERE TO JOIN](#)

Meeting ID
975 4630 1974
Passcode
606854

Phone Only
470 250 9358
646 518 9805
646 558 8656

651 372 8299
301 715 8592
312 626 6799

**TUESDAY, MARCH 14, 2023 (all times in EST) –
NAS Building, Room 120**

OPEN SESSION

All workshop participants can ask questions using Slido. Please navigate to [this link](#) (or use event #1066398) on your phone, tablet, or computer, and enter your question.

8:00–9:00

Breakfast and Arrival

Food should be available to all speakers, registrants, and committee members, but food options and availability will be on a first-come/first-serve basis.

9:00–9:15

Opening Remarks

Steven Moss, NASEM; Study Director
Brenda Bass, University of Utah School of Medicine; Study Committee Co-Chair
Taekjip Ha, Johns Hopkins University; Study Committee Co-Chair

9:15–9:45

Summary from NIH Workshop

Introduction:

Lydia Contreras, University of Texas at Austin (virtual)

Speaker:

Fred Tyson, NIH-NIEHS

Goals of the Session:

- Hear about the main takeaways from the previous workshop on RNA chemical modifications.
- Understand what information was gathered and what information is still needed that was not addressed at the previous workshop.

9:45–10:30

Framing the Workshop

Introduction:

Brenda Bass, University of Utah School of Medicine; Study Committee Co-Chair

Speaker:

Kristin Koutmou, University of Michigan

Goals of the Session:

- Learn about the practical implications of studying RNA and understand real-world impacts of the research.
- Discuss the importance of thinking about implementation when conducting basic research.
- Understand challenges and hurdles related to translating basic science discoveries.

10:30–10:45

Break

10:45-12:15

Direct Sequencing Technologies

Moderator:

Sarath Chandra Janga, Indiana University Purdue University Indianapolis

Speakers:

Eva Novoa, Centre for Genomic Regulation (virtual)

Ben Garcia, Washington University at St. Louis (virtual)

Shuo Huang, Nanjing University (virtual)

Marcus Stoiber, Oxford Nanopore

Goals of the Session

- Explore the current state-of-the-art in science, technology, and computational tools available for direct sequencing technologies.
- Identify scientific and technical hurdles that must be overcome to achieve direct sequencing of RNA and RNA modifications.
- Understand the roles of academic, industrial, and private sectors in development of direct sequencing technology.

12:15-1:15

Lunch

Food should be available to all speakers, registrants, and committee members, but lunch options and food availability will be on a first-come/first-serve basis.

1:15-2:45

Session on Research and Development Around Oligonucleotide Standards

Moderator:

Keith Robert Nykamp, Invitae Corporation

Oligonucleotide Synthesis: Successes and Limitations

Speakers:

Chanfeng Zhao, TriLink Biotechnologies (virtual)

Jia Sheng, University of Albany (virtual)

Data and Computing Resources

Speakers:

Eugene Yeo, University of California, San Diego (virtual)

Standards for Sequencing and Mapping of RNA Modifications

Speakers:

Mark Lowenthal, National Institute of Standards and Technology

Goals of the Session:

- Understand challenges associated with developing and implementing standards for all different aspects of RNA chemical modifications.
- Understand the current technologies for synthesizing modified nucleotide bases.
- Explore challenges with the synthesis of chemical nucleotide chemical standards and if or how we might be able to overcome those challenges.
- Understand the current computational and data successes related to oligonucleotides and explore major challenges related to data standards.
- Discuss activities to standardize processes and information related to modified nucleotides.

2:45-3:45

Lessons Learned from Large-Scale Collaborative Research Endeavors

Moderator:

Mary Majumder, Baylor College of Medicine

Speakers:

Robert Cook-Deegan, Arizona State University

Mark Helm, Institute of Molecular Biology in Mainz, Germany (virtual)

Goals of the Session:

- Discuss major scientific initiatives in the U.S. and abroad.
- Understand the successes and major challenges of such initiatives: Are or were there roadblocks, whether they be political, economic, technical, or otherwise, that hindered success? Can these be avoided in the future?
- Discuss the possibility of a large-scale effort related to RNA.

3:45-4:00

Break

4:00-4:45

Major Concerns and Possible Pitfalls Related to Sequencing and Mapping of RNA Modifications

Moderator:

Juan Alfonzo, The Ohio State University

Speakers:

Todd Lowe, University of California, Santa Cruz (virtual)

Schrage Schwartz, Weizmann Institute of Science (virtual)

Wendy Gilbert, Yale University (virtual)

Rachel Green, Johns Hopkins University

Goals of the Session:

- Listen to concerns from the RNA community related to why an effort to map and sequence the epitranscriptome might be unsuccessful.
- Understand hesitations about the usefulness and impact of such a project.
- Discuss avenues for reconciling differing opinions from the RNA community.

4:45-5:00

Wrap-up from Day 1

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WEDNESDAY, MARCH 15, 2023 (all times in EST)
NAS Building, Room 120

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8:30–8:45

Opening Remarks

Taekjip Ha, Johns Hopkins University; Study Committee Co-Chair

8:45–9:15

Opening Remarks for Framing the Day

Moderator

Taekjip Ha, Johns Hopkins University; Study Committee Co-Chair

Speaker:

Eckhard Jankowsky, Moderna (virtual)

9:15–10:00

Disease and Societal Impacts of RNA Chemical Modifications

Moderator:

Susan Baserga, Yale University and the Yale School of Medicine

Speakers:

Fange (Kathy) Liu, University of Pennsylvania

Dylan Simon, EveryLife Foundation

Phillip Yeske, United Mitochondrial Disease Foundation (virtual)

Goals of the Session:

- Understand the information that is known about how RNA chemical modifications are connected to disease.
- Explore how patient populations are impacted by expanded research on the understanding of disease, especially as it related to RNA.
- Discuss the impacts of diagnostics and treatments as end-products of this research.

10:00–11:00

Breakout Groups to Discuss Needs for RNA Mapping and Sequencing

In-person participants please find breakout group handouts

Virtual participants will be put into groups on the zoom room

11:00–11:15

Break

11:15-12:45

Talks on Interesting Technologies, Methodologies, and Information

Moderator:

Julius Beau Lucks, Northwestern University

Probing the Mechanism of RNA Readers and Writers for Possible RNA Chemical Modification Mapping and Sequencing Tools

Speakers:

Danica Fujimori, University of California, San Francisco (virtual)

Phanourios Tamamis, Texas A&M University

Artificial Intelligence for Sequence and Structure Recognition

Speakers:

Raphael Townshend, Atomic.AI (virtual)

Mary McMahon, ReviR Therapeutics, Inc. (virtual)

Cryo-Electron Microscopy for Structural Determinations of Nucleotides

Speakers:

Elizabeth Villa, University of California, San Diego (virtual)

Jeffery Kieft, University of Colorado Anschutz Medical Campus (virtual)

Goals of this Session:

- Explore emerging tools, technologies, methodologies, and information that are not currently applied to the process of mapping and sequencing the epitranscriptome.
- Discuss any potential opportunities to utilize these tools or ideas as the field advances and explore what information is needed to make that transition

12:45-1:00

Closing Remarks

1:00

Workshop Adjourns

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WEDNESDAY, MARCH 15, 2023 (all times in EST)

CLOSED SESSION

1:30-4:30pm ET

Committee Meeting