

Toward Sequencing and Mapping of RNA Modifications: A Hybrid Workshop

March 13th, 2023 – March 15th, 2023
2101 Constitution Ave NW, Washington, DC 20037



TO BE ANNOUNCED

Meeting ID
000 0000 0000
Passcode
000000

Phone Only	(000) 000-0000
	(000) 000-0000
	(000) 000-0000
	(000) 000-0000

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

CLOSED SESSION

TO BE ANNOUNCED

Meeting ID
000 0000 0000
Passcode
000000

Phone Only
(000) 000-0000
(000) 000-0000
(000) 000-0000

(000) 000-0000
(000) 000-0000
(000) 000-0000

TUESDAY, MARCH 14, 2023 (all times in EST)

OPEN SESSION

8:00–9:00

Breakfast and Arrival

Event registrants will receive food 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

Taekijp 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

Speakers:

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

Event registrants will receive food 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

Event registrants will receive food on a first-come/first-serve basis.

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 (virtual)

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

TO BE ANNOUNCED

Meeting ID
000 0000 0000
Passcode
000000

Phone Only
(000) 000-0000
(000) 000-0000
(000) 000-0000

(000) 000-0000
(000) 000-0000
(000) 000-0000

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

OPEN SESSION

8:00–9:00

Breakfast and Arrival

Event registrants will receive food 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

9:15-10:00

Disease and Societal Impacts of RNA Chemical Modifications

Moderator:

To be announced

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

11:00-11:15

Break

11:15-12:45

Talks on Interesting Technologies, Methodologies, and Information

Moderator: *To be announced*

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)

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

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

Event registrants will receive food on a first-come/first-serve basis.

TO BE ANNOUNCED

Meeting ID
000 0000 0000
Passcode
000000

Phone Only
(000) 000-0000
(000) 000-0000
(000) 000-0000
(000) 000-0000

(000) 000-0000
(000) 000-0000
(000) 000-0000

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

CLOSED SESSION