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## **July Newsletter**

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# **Exposomics in Focus** at FrESH

Frontiers in Environmental Science and Health (FrESH) is an innovative, advanced program that seeks to train and mentor promising graduate students, medical students, postdoctoral fellows, and junior faculty in environmental health science research; emphasizing how the environment impacts human health. FrESH offers dynamic training consisting of daily lectures from leading experts, active learning sessions, and extended discussion on emerging topics, followed by hands-on laboratory sessions during a week-long summer course at Morehouse School of Medicine. FrESH recently completed its 4th year and will host its 5th course in 2026.

Last year, FrESH leadership awarded Dr. Gary Miller with the Pioneer Award for his outstanding and pioneering work in exposomics. Guided by Dr. Miller's participation in FrESH since its inception and through one of the major goals of FrESH to emphasize the important role environmental exposures contribute to human health, Drs. Winston Thompson and Charles Easley (co-Directors of FrESH) decided to feature Exposomics in the 4th year of the FrESH training program, which was held June 1st-7th at Morehouse School of Medicine.

For the 4th year course, a number of exposome-themed lectures and lab sessions incorporated single-cell multiomics in exposures in human health, high-resolution metabolomics, high-resolution mass spectrometry to identify chemical contaminants in environmental and human samples. exposomics in neurodegeneration. and exposomics in cancer and cancer health disparities.



The highlight was having the Director of the National Institute of Environmental Health Sciences, Rick Woychik, PhD give the keynote address. The lectures and lab sessions were given by leaders in the field including Drs. Miller, Dean Jones, Melissa Davis, Xin Hu, and Randolph Singh.

NEXUS was well represented at the FrESH 4th year course, the co-Director of FrESH Winston Thompson, Ph.D., Morehouse School of Medicine is also a member of the NEXUS Collaborative Hub.



Additionally, Dr. Miller gave the lecture "Exposomics in practice: new approaches to studying neurodegeneration", alongside NEXUS collaborator Dr. Randolph Singh who led the "Leveraging high resolution mass spectrometry based exposomics for identifying chemical contaminants in environmental samples and human studies."

NEXUS Collaborator Dr. Dean Jones whose lecture covered "Use of highresolution metabolomics for the identification of metabolic signals associated with ubiquitous pollutants". Dr. Randolph Singh also led a lab on a dedicated Exposome Day of the FrESH course.



Other notable speakers were in attendance including Dr. Melissa Davis who leads

SAMBAI, a 2024 <u>Cancer Grand Challenge</u> award. SAMBAI brings together a multidisciplinary team of researchers and institutions across the United States, United Kingdom, and Africa in an effort to "decode the factors that cause and influence disparate cancer outcomes in underserved populations of African descent." Drs. Miller and Singh lead the SAMBAI "Work Package 2" to conduct exposomics analysis using high-resolution mass spectrometry.

As FrESH continues, the team plans to further integrate the exposome into the FrESH curriculum because the exposome truly captures what they have historically viewed as "Nurture", and understanding both the "Nature" and "Nurture" components will help drive important discoveries towards curing some of the most devastating human health crises of our time.

NEXUS is excited to continue building a partnership with FrESH and to expand exposomics into the curriculum.



Read the full article here



Ft. Fabien Agenes, PhD and Robert Barouki, MD, PhD of <u>Inserm</u>



Episode 2

Tt. Benedikt Warth, PhD, University of
Vienna, Austria, Caspar Safarlou, PhD,
<u>Utrecht University</u>. The Netherlands,
Zodwa Dlamini, PhD, University of
Pretoria, South Africa, and Myriam
Mrad, PhD, University of Balamand,
Lebanon



Episode 3
Ft. Tina Woods, MBA, Founder and
CEO of Collider Health, Anil Bajnath
Founder and President of The
American Board of Precision Medicine,
George Washington University; Krisna
Bhargava, PhD, Founder of expin.ai.



Episode 4

Ft. Este Geraghty, MD, Chief Medical
Officer and Health Solutions Director
at Esri; Eric Klos, CEO, Founder and
Innovator of DailyBreath, and Emilie
Calabre, PhD, Chief Scientific Officer
at Meersens

# **NEXUS** in the News

The Lancet

"The human exposome

project"





Cold Spring Harbor
Laboratory
"Exposomics: Holistic
health without the
snake oil"





UnDark Magazine
"Uncovering the
Exposome: An
Emerging Field Casts a
Wide Net"
By: Emma Foehringer
Merchant





# **Spotlight**

## Arcot Rajasekar, Ph.D.

University of North Carolina at Chapel Hill



Learn more

Dr. Arcot Rajasekar is a Professor at the UNC School of Information and Library Science (SILS) and a Chief Scientist at the Renaissance Computing Institute (RENCI). Previously he was at the San Diego Supercomputer Center at the University of California, San Diego, leading the Data Grids Technology Group. In NEXUS, Dr. Rajasekar leads the NEXUS Geospatial Hub in collaboration with NEXUS MPI Rima Habre, PhD, of the University of University of Southern California.

The NEXUS Geospatial Hub aims to pioneer innovative methods to examine how social and environmental factors influence health by developing a scalable geospatial data framework that enables researchers and public health officials to connect place-based exposures in the external environment with health outcomes at both the population and individual levels.

Dr. Rajasekar has been involved in research and development of data grid middleware systems for over a decade and is a lead originator behind the concepts in the Storage Resource Broker (SRB) and the integrated Rule Oriented Data Systems (iRODS), two premier data grid middleware developed by the Data Intensive Cyber Environments (DICE) Group.

A leading proponent of policy-oriented, large-scale data management, Dr. Rajasekar has several research projects funded by the National Science Foundation, the National Archives, National Institute of Health and other federal agencies. He has more than 150 publications in the areas of data grids, digital library, persistent archives, logic programming, and artificial intelligence. His latest projects involve applying data modeling and mining for PFAS data, using generative AI for enabling data discovery for neuro imaging datasets and developing data workbench for exposomics.

Fun Fact! Dr. Rajasekar is an avid but discerning numismatist. He collects many of the modern mint commemorative coins (do you know that the America the Beautiful Quarters series honored more than 50 national parks and sites in the United States?) He is particularly interested in Colonial coinage and also collects Byzantine emperor Justinian

# **NEXUS Collaboration Feature**

#### **EHLRICH and MOSSAIC**

Electronic Health Records-Informed Lagrangian Method for Precision Public Health (EHRLICH)

Modeling Outcomes Using Surveillance Data and Scalable Artificial Intelligence for Cancer
(MOSSAIC



This month, NEXUS is proud to spotlight the Electronic Health Records-Informed Lagrangian Method for Precision Public Health (EHRLICH) and Modeling Outcomes Using Surveillance Data and Scalable Artificial Intelligence for Cancer (MOSSAIC). In a special feature for the NEXUS blog, Dr. Heidi Hanson of Oak Rildge National Laboratory shares insights about the projects' aims and current work.

The MOSSAIC and EHRLICH teams leverage the Department of Energy's world-class computing facilities, powered by exascale supercomputers capable of executing over 1 quintillion calculations per second. These systems enable the development of tools that facilitate deep-learning capabilities for large-scale exposomic research by synthesizing data and making possible population-level simulations while ensuring patient privacy and data security. Prospective digital twins for population health will allow for in-depth investigations into how environmental factors affect health outcomes.

Read the full EHLRICH and MOSSAIC Feature



# NEXUS Exposome Harmonized Measurements Initiative

The deadline to complete this survey has been extended to July 30, 2025!

Take the survey

Exposome Harmonized Measurements Initiative to assess the chemical space covered by current and emerging technologies in biological and environmental matrices. As a first step, The ChemBio Hub is requesting the community's input via a survey on methods and tools used to measure molecular features of the exposome. The survey results will be used in part to design the Exposome Harmonized Measurements Initiative. Ultimately, we hope that the results of this survey will inform the development of a harmonized method for measuring the exposome.

Learn more about the NEXUS ChemBio Analytical Sciences Hub



## **Upcoming Events**

#### The Exposome Boot Camp: Measuring Exposures on an **Omic Scale**

July 17-18, 2025 New York, New York



A two-day intensive boot camp of seminars and hands-on analytical sessions to provide an overview of concepts, techniques, and data analysis methods used in studies of the exposome. Led by a team of expert scientists in the rapidly growing field of exposomics the boot camp will integrate seminar lectures with hands-on computer lab sessions to put concepts into practice. Emphasis will be given to leveraging existing resources from ongoing studies and initiating new investigations. The afternoon lab sessions will provide an opportunity to work hands-on with real data. Participants will learn and practice data handling, cleaning, and basic analysis of exposomics data.

#### 2025 Instructors

Training Director: Gary Miller, PhD, Columbia University Mailman School of Public Health Rima Habre, ScD, USC Keck School of Medicine

Dean Jones, PhD, Emory University School of Medicine
Vrinda Kalia, PhD, Columbia University Mailman School of Public Health

Yunjia Lai, PhD, Columbia University Mailman School of Public Health

Shuzhao Li, PhD, The Jackson Laboratory Chirag Patel, PhD, Harvard Medical School

Krystal Pollitt, PhD, Yale School of Public Health

Randolph Singh, PhD, Columbia University Mailman School of Public Health

<u>Douglas Walker</u>, PhD, Emory University Rollins School of Public Health

Learn more

## **NEXUS Community Events**

**Course in Computational** Metabolomics for Clinical Research by Icahn **School of Medicine at Mount** 



Sinai

July 21-25, 2025 Virtual

The Computational Metabolomics for Clinical Research course will cover innovative software, online tools and knowledge bases to analyze metabolomics datasets. Metabolomics enables discoveries of metabolic mechanisms and predictive biomarkers that can be translated into new prevention and treatment strategies for human diseases

Learn more

#### **ISES & ISEE Joint Annual** Meeting

August 17-20, 2025 Atlanta, Georgia



The annual joint meeting between International Society of Exposure Science and International Society for Environmental Epidemiology is taking place in Atlanta, Georgia this August. The theme of the meeting is "Global Environmental Health Equity across the Lifespan" and NEXUS Collaborator Douglas Walker, PhD, Emory University and NEXUS Chem bio co-lead Krystal Pollitt, PhD, Yale School of Public Health will both be hosting a workshops. Registration is Open!

# Half Day Workshop

WS09: Wristbands 101: Harnessing Wearable Tech for Personalised Environmental Exposure Assessment (Krystal Pollitt, Ph.D.)

#### Full Day Workshops:

WS02: High-resolution mass spectrometry workflows to study the exposome ( Douglas

#### NEXUS-Related Talks:

"Community Wide Perspectives, Methodologies, and Applications in Exposomics: Results from the Network for Exposomics in the U.S. (NEXUS) Center for Exposome Research Coordination Survey"

Learn more

# ECHO Symposium: Translating Science to Action

September 15, 2025 Bethesda, MD/ Online



The Environmental influences on Child Health Outcomes (ECHO) Program is a research program supported by the National Institutes of Health (NIH), to enhance the health of children for generations to come. The ECHO Translating Science to Action Symposium brings together researchers, policymakers, health professionals, and advocates to translate child health research into impactful solutions.

Learn more

#### Santiago Exposome Symposium

September 25-27, 2025 Santiago, Chile



Registration is open for "The Second Latin American Exposome Symposium will be held in Santiago, Chile, focusing on the theme "Integrating Environmental Exposures into Aging, Alzheimer's Disease, and ADRD Research." This event will bring together leading scientists in Alzheimer's Disease and Related Dementias (ADRD), Environmental Health, and Exposomics to examine how environmental exposures impact ADRD. Special emphasis will be placed on regional cohorts such as PELOTAS, 10/66, and other studies from across Latin America. The symposium seeks to bridge gaps in ADRD research by fostering collaboration between the Alzheimer's and environmental science communities in Latin America, the United States, and beyond. Keynote talks, poster sessions, and hands-on workshops will cover innovative topics, including geospatial modeling, digital biomarkers for detecting cognitive decline, and prodromal markers of ADRD. To promote collaboration, the event will support students and junior researchers from the region through travel awards. These efforts aim to build partnerships and catalyze new research at the intersection of environmental health and aging."

This meeting is being hosted by The Institute for Exposomic Research at the Icahn School of Medicine at Mount Sinai

Learn more

Visit the NEXUS Calendar

We want to feature your exposome-related events on the NEXUS website and social media!

Event form

### **Feature Podcasts**

As the NEXUS Podcast is being constructed, please enjoy the recent episode of The Metabolomist by <u>Biocrates</u> which features NEXUS MPI Gary Miller, PhD, Columbia University.

The Metabolomist is a podcast Hosted by Alice Limonciel which is a <u>"forum to connect metabolomics scientists and their stories"</u>



"Exposomics & 5P medicine"

Listen to the episode

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