

NIH Awards \$50.3 Million for “Multi-Omics” Research on Human Health and Disease

Funding will support research on conditions including fatty liver disease, liver cancer, asthma and chronic kidney disease.

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The National Institutes of Health is establishing the Multi-Omics for Health and Disease Consortium, with approximately \$11 million awarded in the consortium’s first year of funding. The new consortium aims to advance the generation and analysis of “multi-omic” data for human health research.

Multi-omics refers to a research approach that incorporates several “omics” data types derived from different research areas — such as genomics, epigenomics, transcriptomics, proteomics and metabolomics. Each of these data types reveals distinct information about different aspects of a biological system, and leveraging all these data types at once is becoming increasingly possible with advances in high-throughput technologies and data science.

The integration of multiple types of data from an individual participant’s biological sample can provide a more holistic view of the molecular factors and cellular processes involved in human health and disease, including untangling genetic and non-genetic factors in health and disease. Such an approach offers great promise in areas such as defining disease subtypes, identifying biomarkers and discovering drug targets.

“Beyond gaining insights into individual diseases, the primary goal of this consortium is to develop scalable and generalizable multi-omics research strategies as well as methods to analyze these large and complex datasets,” said Joannella Morales, PhD, a National Human Genome Research Institute (NHGRI) program director involved in leading the consortium. “We expect these strategies will ultimately be adopted by other research groups, ensuring the consortium’s work will have broad and long-lasting impacts for clinical research.”

Approximately half of the awarded funds will support the work of six disease study sites, which will examine conditions such as fatty liver diseases, hepatocellular carcinoma, asthma, chronic kidney disease and preeclampsia, among others. The sites will enroll research participants, at least 75% of whom will be from ancestral backgrounds underrepresented in genomics research. The sites will

also collect data on participants' environments and social determinants of health to be used in conjunction with the multi-omics data. Combining the multi-omic and environmental data can offer an even more comprehensive view of the factors that contribute to disease risk and outcomes.

Specimens provided by participants will be processed at the omics production center, which will use high-throughput molecular assays to generate genomic, epigenomic, transcriptomic, proteomic and metabolomic data that will be analyzed to generate molecular profiles of disease and non-disease states. The data analysis and coordination center will then incorporate all of these data into large, organized datasets that will be made available to the scientific community for further studies.

"Multi-omics studies are at the forefront of biomedical research and promise to advance our understanding of disease onset and progression," said Erin Ramos, PhD, MPH, deputy director of NHGRI's Division of Genomic Medicine. "All while potentially providing important clues for treatment design and drug-discovery efforts. This new consortium is an important step in making those advances a reality."

Approximately \$50.3 million will be awarded to the consortium over five years, pending the availability of funds. The award is funded jointly by NHGRI, the National Cancer Institute (NCI) and the National Institute of Environmental Health Sciences (NIEHS).

Multi-Omics for Health and Disease Consortium

Disease study sites and principal investigators

- Louise Laurent, MD, PhD, University of California, San Diego
- Krzysztof Kiryluk, MD, Columbia University — New York City
- Stephanie Christenson, MD, University of California, San Francisco — co-funded with NIEHS
- Vaia Lida Chatzi, MD, PhD, University of Southern California Keck School of Medicine — Los Angeles — co-funded with NIEHS
- Tanika N. Kelly, MD, MPH, Tulane University — New Orleans — co-funded with NIEHS
- Joseph McCormick, MD, University of Texas Health Science Center — Houston — funded by NCI

Omics production center and principal investigator

- Gary J. Patti, PhD, Washington University — St. Louis

Data analysis and coordinating center and principal investigator

- Zhiping Weng, PhD, University of Massachusetts Chan Medical School — Worcester — co-funded with NCI

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