

Metabolomics

Metabolomics involves the analysis of the low molecular weight complement of cells, tissues, or biological fluids.

Metabolomics makes it feasible to uniquely profile the biochemistry of an individual or system. This technology is used to determine the pattern of changes (and related metabolites) arising from disease, dysfunction, disorder, or from the therapeutic or adverse effects of xenobiotics.

Metabolomics has come to the fore to reveal biomarkers for the early detection and diagnosis of disease, to monitor therapeutic treatments, and to provide insights into biological mechanisms.

The NIH Eastern Regional Comprehensive Metabolomics Resource Core (ERCMRC), funded by the National Institutes of Health (NIH) Common Fund, is directed by [Dr. Susan Sumner](#) and is one of six RCMRCs in the United States working in a consortium to establish national standards, conduct pioneering research, provide training, and foster collaborations that will advance translational research.

ERCMRC Capabilities

The ERCMRC has a wide range of instrumentation to facilitate broad spectrum and targeted metabolomics analysis of polar or nonpolar components, as well as methods for targeted analysis of metabolites and minerals. Our capabilities include

- Nuclear magnetic resonance (NMR) spectroscopy
- Liquid chromatography-mass spectrometry (LC-MS/MS, UPLC-Q-TOF-MS)
- Gas chromatography-mass spectrometry (GC-MS, 2D-GCTOFMS)
- Inductively coupled plasma mass spectrometry, and Orbitrap

The ERCMRC has experience with analysis of cells, organ tissue (e.g., liver, uterus, testes, brain), biological fluids (e.g., urine, serum, plasma, sweat, saliva, amniotic fluid), and exhaled breath collected from human subjects, or animal models.

Following signal detection, ERCMRC scientists apply statistical and mathematical tools and use their expertise to identify data trends that show the correlation of specific signals with the phenotypic response under investigation. Identified signals are mapped to biochemical pathways through the use of specialized software and expert biochemist interpretation to derive biomarkers and mechanistic insights.

ERCMRC Partners

Partners to the ERCMRC, which is located at the University of North Carolina at Chapel Hill, include RTI International (RTI, located in the Research Triangle Park, NC) and the David H. Murdock Research Institute (DHMRI, located in Kannapolis, NC).

Training Program

The ERCMRC offers training to undergraduate and graduate students and postdoctoral fellows. This training program aims to develop a pipeline of future metabolomics investigators. The intern will gain experience using state-of-the-art metabolomics technologies (e.g., chromatography-mass spectrometry, NMR spectroscopy) for measuring endogenous metabolites in cells, tissues, and biological fluids. Interns will also gain experience with software and statistical methods for identification of metabolites and pathway mapping.

NIH Common Fund Metabolomics Program Resources

Learn about available resources for metabolomics research at the six regional cores.

- NIH Eastern Regional Comprehensive Metabolomics Resource Core at UNC Chapel Hill
- [West Coast Metabolomics Center \(WC³MRC\)](#)
- [Michigan Regional Comprehensive Metabolomics Research Core \(MRC²\)](#)
- [Southeast Center for Integrated Metabolomics \(SECIM\)](#)
- [Resource Center for Stable Isotope-Resolved Metabolomics \(RCSIRM\)](#)
- [Mayo Clinic Metabolomics Resource Core](#)

Nominate compounds for synthesis by the Metabolite Standards Synthesis Core.

- [Metabolomics Workbench: Resources and Datasets](#)

Find and use resources and data sets at the NIH Common Fund Metabolomics Data Repository and Coordinating Center.

- [Metabolomics Workbench: Nominate Compounds for Synthesis by the Metabolite Standards Synthesis Core](#)

Further Resources

- [Call for Pilot and Feasibility Project Applications](#)
- [Pilot and Feasibility Studies Application Form](#)
- [Prior Pilot and Feasibility Studies](#)
- [Selected Publications and Presentations](#)