

Metabolomics Research Core

In partnership with the North Carolina Translational & Clinical Sciences (NCTraCS) Institute, RTI International offers opportunities to collaborate with our metabolomics researchers to discover biomarkers, reveal mechanistic insights, synthesize metabolite standards, determine characteristics of exposure, and receive training in metabolomics research.

Overview

Metabolomics involves the analysis of the low molecular weight complement of cells, tissues, or biological fluids. Metabolomics makes it feasible to uniquely profile (metabotyping) the biochemistry of an individual or system apart from or in addition to the genome. Metabolomics has come to the forefront to reveal biomarkers for the early detection and diagnosis of disease, to monitor therapeutic treatments, and to provide insights into biological mechanisms.

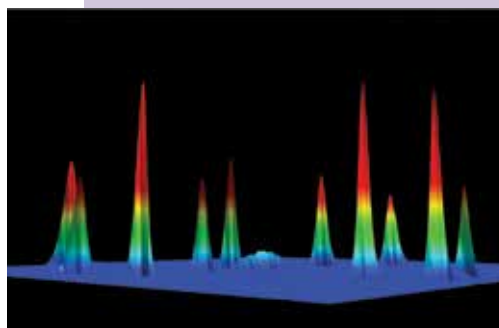
Services

Study Design Consultation

- Review literature to determine relevancy, level of innovation, and likelihood of success in proposed area of research
- Define needs for approval from Institutional Review Board or Animal Care and Use Committee
- Review metadata associated with samples in biorepository for appropriate samples selection
- Provide guidance on
 - Sample collection and storage
 - Types of analytical methods that best address study needs
 - Types of metabolite standards and best positions for isotopic labeling
 - Relevant environmental measures

Data Analysis

Following signal detection, RTI scientists apply statistical and mathematical tools (e.g., Umetrics, Spotfire, SAS) 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 such as GeneGo, and expert biochemist interpretation to derive biomarkers and mechanistic insights.



Analytical Capabilities

We have experience in the analysis of exogenous and endogenous compounds in cells, tissues, and biological fluids collected from animal models or human subjects. Our analytical capabilities for targeted and broad-spectrum analysis include

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

Types of Assays

- Broad spectrum metabolomic via UPLC-Q-TOF-MS, 2D-GC-TOF-MS, and NMR
- Targeted quantitative NMR
- Targeted quantitative endocannabinoid analysis
- GC-MS for the measurement of organic acids, free fatty acids, and total fatty acids
- LC-MS/MS for the measurement of acylcarnitines, acyl coenzymes, and amino acids
- Multidimensional NMR
- Metabolic flux analysis
- ICP-MS for metals, minerals, and metallomics
- Environmental measures such as particulate matter mass, tobacco smoke, endotoxins, indicators of molds and fungi, NO₂, volatile organic compounds, pyrethroids, non-persistent pollutants, phthalate monoesters, organophosphorus pesticides, perfluorinated octanyl sulphonates, organochlorine, flame retardants, and metabolites of PCBs and PBDEs

RTI Metabolite Synthesis Capabilities

Our facility is well equipped and staffed for the synthesis and characterization of unlabeled metabolites as well as labeled compounds (such as ¹³C, ¹⁵N, ¹⁴C).

Tier 1: Consultation and Initial Planning (4–12 hours)

Tier 1 services will involve one or more meetings between the Metabolomics Core and the interested investigator to discuss the project and determine the level and type of metabolomics services appropriate for the project.

Tier 2: Statement of Work (12 hours)

Tier 2 services will be provided to projects that have a clear path to success. Metabolomics Core members will work with investigators to develop a statement of work or protocol, budget, and timeline.

Tier 3: Metabolomics Analysis or Synthesis (40–120 hours)

Tier 3 studies will involve metabolomics analysis and synthesis.

Core Leadership

Susan Sumner, PhD

Susan Sumner is Director of Systems and Translational Science at RTI, and Director of the NIH Eastern Regional Comprehensive Metabolomics Resource Core.

More Information

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